Rock Products

Handle Larger Rock

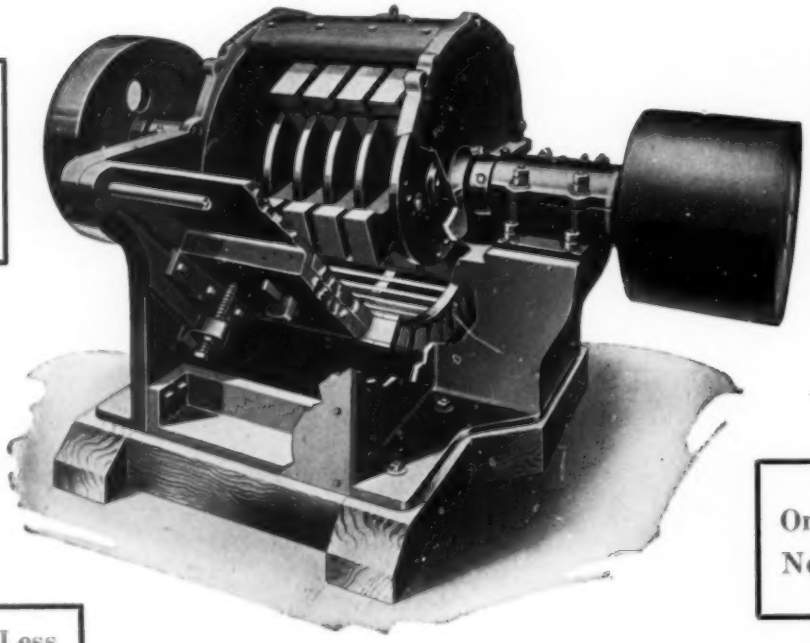
WHY MORE PLANTS ARE INSTALLING

• WILLIAMS •

HAMMER CRUSHERS

Better Control Over Size of Product

Reduces to Desired Size • • • in one operation

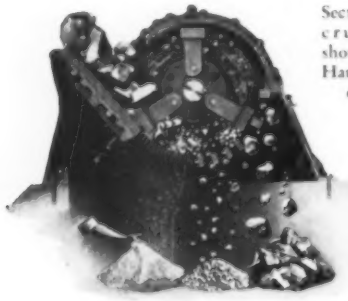


Jumbo Junior Crusher with section removed to show crushing parts.

Cubular Stone • • • No Slivers

Only One Crusher Needed for the Job

25% to 75% Less Investment • • • Cheaper Crushing



Sectional view of crusher used to show the Williams Hammer Principle of crushing.

If you plan additional rock crushing equipment investigate Williams Hammer Crushers. Usually one Williams will take the place of two or three other crushers at a considerable saving in investment and operating costs. Thirty sizes make it easy to select exactly the proper machine for your work. Large sizes handle power shovel loaded stone and crush to 2", 1¼" or smaller. Smaller sizes handle screen rejects or hand-loaded rock and reduce to 1¼", 3" or agstone. Get our recommendations on your crushing, pulverizing, screen or air separation job.

. . . *Write for illustrated bulletins* . . .

The Williams Patent Crusher & Pulverizer Co.

800 St. Louis Avenue • ST. LOUIS, MO.

Sales Agencies in All Principal Cities Including

Chicago	New York	San Francisco
37 W. Van Buren St.	15 Park Row	326 Rialto Bldg.

THE WILLIAMS PATENT CRUSHER & PULVERIZER CO. ST. LOUIS, MO. U.S.A. TRADE MARK REG. U.S. PAT. OFF.

Williams

OLDEST AND LARGEST BUILDERS OF HAMMERMILLS IN THE WORLD

PATENT CRUSHERS GRINDERS SHREDDERS

Rock Products

With which has been consolidated the journals

CEMENT and ENGINEERING NEWS CONCRETE PRODUCTS

Founded 1896 Est. 1918

RECOGNIZED THE WORLD OVER AS THE LEADER IN ITS FIELD

Contents

NOVEMBER, 1937

▼ ▼ ▼

DEPARTMENTS

Indexed in the Industrial Arts Index. Published Monthly. Subscription Price: United States and Possessions, Mexico, Cuba, Canada, $2.00; and $4.00 to foreign countries. Twenty-five cents for single copies.

To Subscribers—Date on envelope indicates issue with which your subscription expires. In writing to have address changed, give old as well as new address.

Entered as second-class matter, Jan. 30, 1936 at the Chicago, Ill., postoffice, under the Act of March 3, 1879.

MEN TRIED JUST AS HARD TO TIE BELT ENDS TOGETHER

A typical example of Goodrich development in rubber

GROWN men, trained engineers, tried to fasten belt ends together —and for many years their splices were as apt to come apart as the little fellow's shoestrings.

Some belts could be laced up or held with metal fasteners but those high-tension belts on heavy machines, or high-speed belts running a mile a minute, or more, failed at the splices with discouraging regularity. Goodrich research men, already busy with other improvements in belting, took this as the problem of the year.

They found failures came not so much from *weak* splices as from tension and air resistance. Even the thinnest feather-edge of fabric would be loosened by repeated flexing and air currents; then the belt plies would separate. So they designed a splice in which a section of an inner ply is removed, the outer ply carried under the surface, covered, sealed with rubber and vulcanized in a portable electric vulcanizer. Belts with this new "Ply-lock" splice lasted sometimes ten times as long as the old belts. Users constantly tell us of serious belt problems which have been completely solved.

Goodrich is always busy with development work on rubber products. Much of it applies to new products, new uses—but no product is too "staple" or too *standardized* to get its share of this work. Goodrich research in rubber has resulted in important improvements in conveyor belts, rubber-lined pipe, steam hose, suction hose and hundreds of other products classed generally as mechanical rubber goods. Ask your Goodrich distributor about them. Write us if you don't know him. The B. F. Goodrich Company, Mechanical Rubber Goods Division, Akron, Ohio.

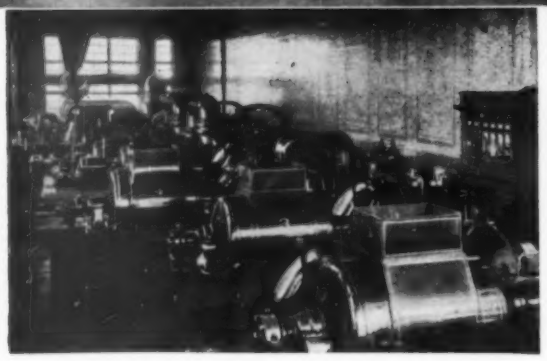
Goodrich

ALL *products problems* IN RUBBER

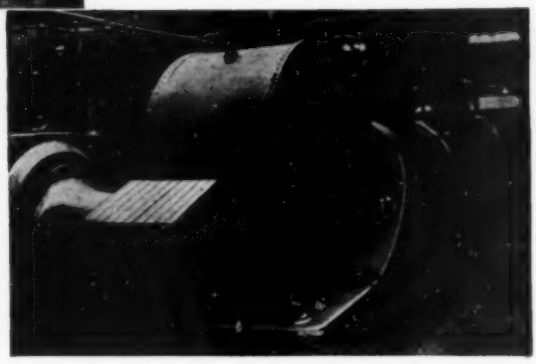
THREE FACTS

THAT POINT *ONE WAY*

DIESELS . . . ***more Diesel h.p. in this country is lubricated with Texaco than with any other brand.*** No product offered Diesel operators has equalled the popularity of the Texaco Ursa series of oils for Diesel cylinder lubrication.



TURBINES . . . ***large central stations the world over*** use Texaco Regal Oils in their turbines. Turbine builders the world over highly recommend these highest grade turbine lubricants.



RECIPROCATING ENGINES . . . ***this 12,500 h.p. Reciprocating Engine*** is Texaco-lubricated 100%. It runs a blooming mill in the plant that rolls the largest steel plates in the world.

HARD-BOILED power plant operators don't continue using a lubricant, unless that lubricant backs them up, eases their day's work, keeps their engines efficient.

Hundreds of power plants use nothing but Texaco . . . have used no other brand for many years. They KNOW that Texaco Lubricants do their job.

Trained lubrication engineers are available for consultation on the selection and application of Texaco Products. Prompt deliveries assured through 2070 warehouse plants located throughout the United States.

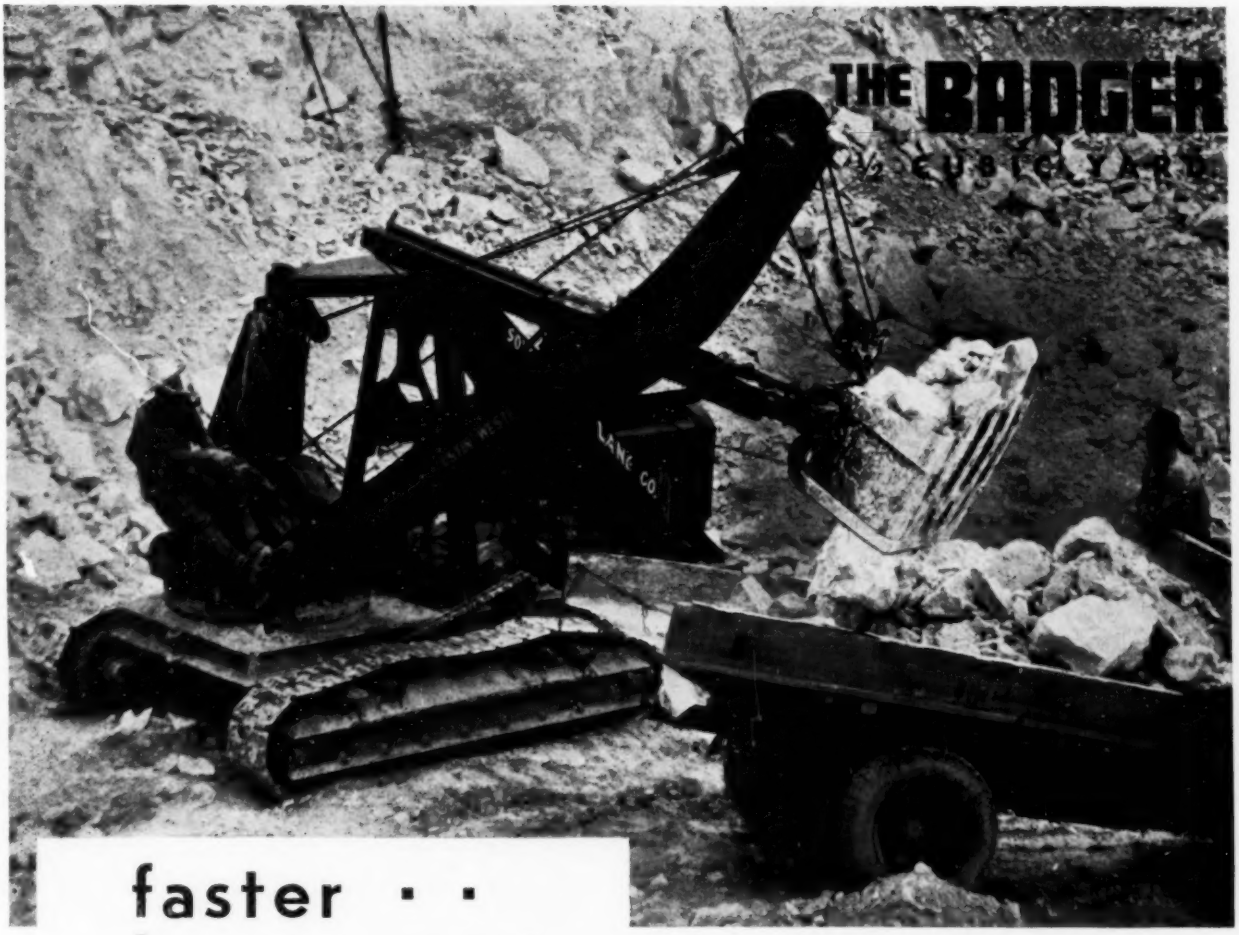
Call in a Texaco representative. Find out what Texaco can mean to you in improved operation.

The Texas Company, 135 East 42nd Street, New York City.

TEXACO

TEXACO *LUBRICANTS*

FOR ALL TYPES OF ENGINES



faster · · · · lowers cost

Whether you are stripping dirt, stock piling, or loading heavy boulders, the Austin-Western Badger is the fastest, most economical ½-yard shovel you can buy.

It's faster: the usual swinging weight of the motor, cab and counterweight are eliminated for faster start, swing, stop, resulting in greater daily output.

It's cheaper to operate: by eliminating dead swinging weight there is less inertia to overcome in starting and stopping. This permits the use of motors with a smaller horse power resulting in lower fuel and maintenance costs, without loss of speed.

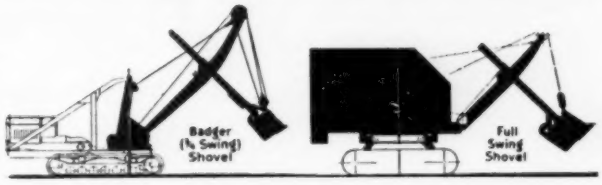
And the Badger digs hard: with a low center of gravity and the whole shovel acting as a counterweight it stands up easily to the ten thousand pound single live pull of the three port line.

Fully roller bearing equipped, easy to transport, easily convertible, the Badger has the strength, speed and endurance that make it outstanding in its class.

Write for construction details and performance records.

THE AUSTIN-WESTERN ROAD MACHINERY CO.
AURORA, ILLINOIS

Austin-Western



Compare these 2 diagrams above

In the two diagrams above are shown (in heavy black) the moving parts of the Badger ¾-swing in comparison with Full Swing Shovels. Note the difference.

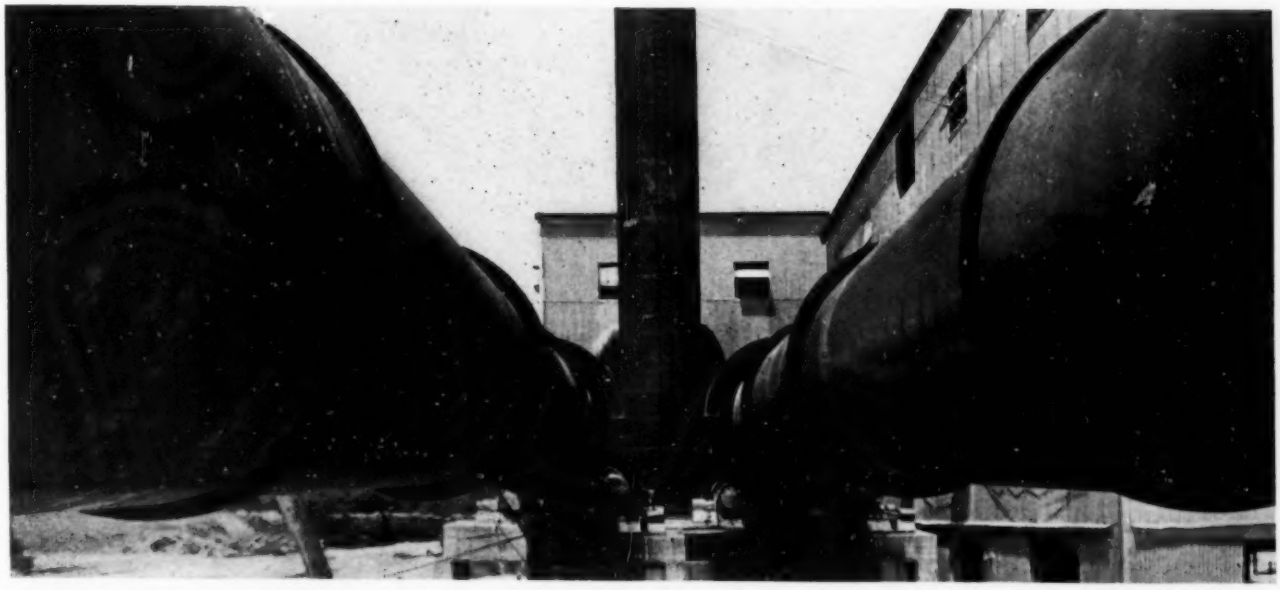
The Badger has greater speed because it has less inertia and momentum to overcome at the start and stop of the swing. This greater speed together with full half yard dipper capacity makes for outstanding performance in this shovel.

The Austin-Western Road Machinery Co., 1844 Barrows St., Aurora, Ill.
( ) Send a salesman.
Tell me more about:

( ) Shovels & Cranes	( ) 5-Yd. Scraper
( ) Elevating Graders	( ) Rippers & Scarifiers
( ) Blade Graders	( ) Crushing & Screening Plants
( ) Motor Graders	( ) Gravel Washing Plants
( ) Road Rollers & Roll-A-Planes	( ) Bituminous Distributors
( ) Motor Sweepers	
( ) 12 Yd. Scraper	

Name .....
Address .....
City ..... State .....

TRAYLOR-CHEESMAN KILN-COOLER-BURNER SYSTEM



WE BUILD

BURNERS
ROTARY KILNS
ROTARY COOLERS
ROTARY DRYERS
ROTARY SLAKERS
SCRUBBERS
EVAPORATORS
JAW CRUSHERS
GYRATORY CRUSHERS
REDUCTION CRUSHERS
CRUSHING ROLLS
GRINDING MILLS
BALL MILLS
ROD MILLS
TUBE MILLS
PUG MILLS
WASH MILLS
FEEDERS
ROTARY SCREENS
ELEVATORS

Welded or Riveted Stacks, Tanks and Bins for any purpose.

Better product, more of it, AND a saving of at least 25% in fuel cost (some installations have shown greater economy) —these are the rewards for those operators who use the Traylor-Cheesman Kiln-Cooler-Burner System.

Why? For one reason, the entire calcining and cooling process is under complete control at all times, and for another, expensive heat is used over again and,—well, you must know we can't tell a long story here, so we suggest you write TODAY for our Bulletin 116, and get ALL of the reasons in full!

TRAYLOR ENGINEERING & MANUFACTURING CO.

ALLENTOWN, PENNSYLVANIA, U.S.A.

NEW YORK CITY 3916 Empire State Bldg.
CHICAGO 815 One La Salle Street Bldg.
SALT LAKE CITY 101 West Second South St.
LOS ANGELES 919 Chester Williams Bldg.
SEATTLE 6311 22nd Ave., N. E.

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MAQUINARIA
Isabel De Catolica 40, Mexico, D.F

MANILA MACH. & SUPPLY CO.
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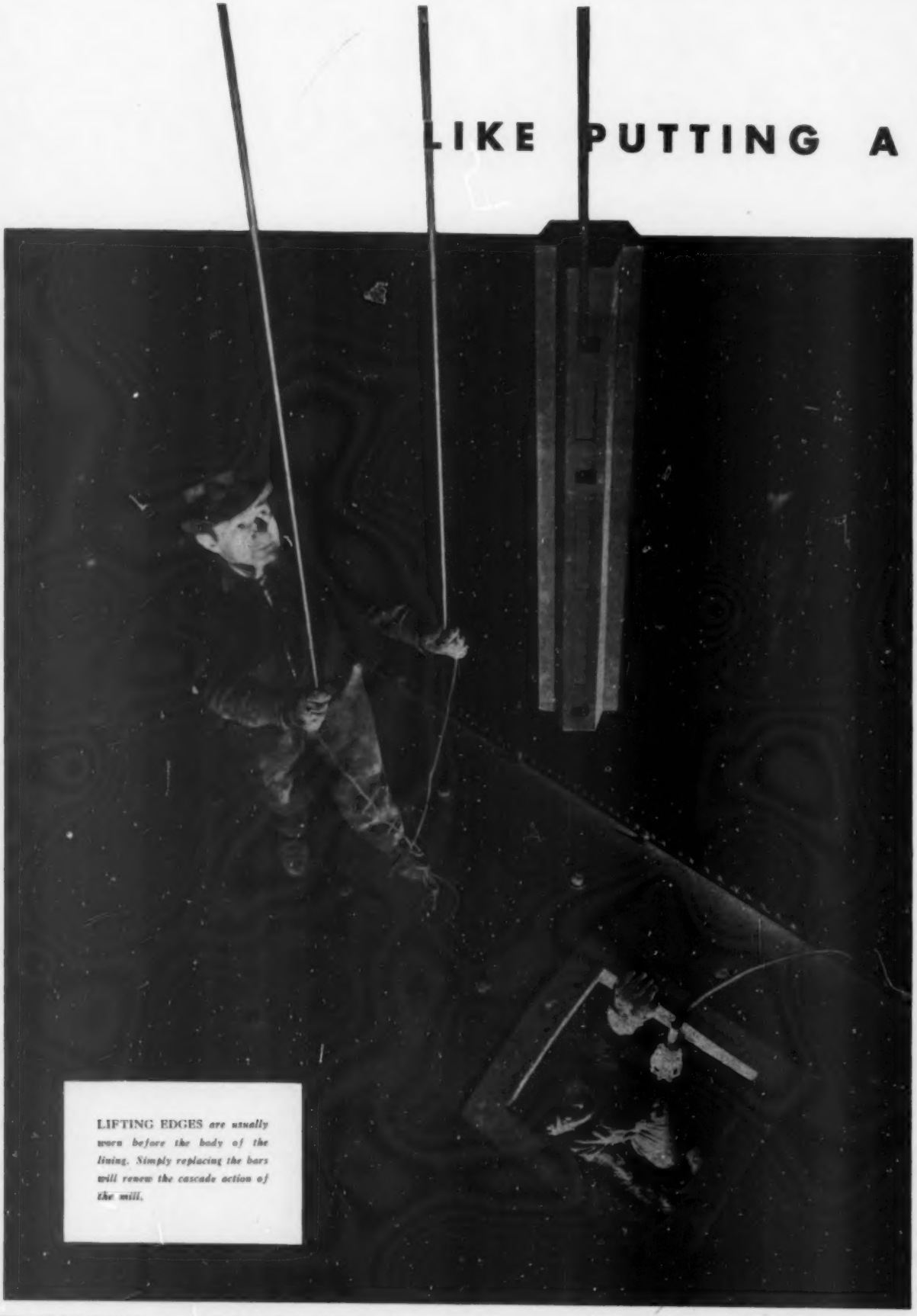
European Works—Usines Carels Freres, Ghent, Belgium

LIKE PUTTING A



LIFTING EDGES *are usually worn before the body of the lining. Simply replacing the bars will renew the cascade action of the mill.*

NEW BLADE IN THE OLD RAZOR

YOUR morning shave would be pretty expensive if you had to buy a new razor every time the cutting edge became dull. Instead, you get renewed cutting action by inserting a new blade. In your grinding mills you can get renewed grinding action by using this same principle . . . by replacing only the worn part.

With older style cast linings, worn edges reduce lifting action, and the whole plate has to be changed. When you use the new USS Lorain Rolled Steel Plate Lining, you can get new lifting action by reversing or renewing the lifting bars alone. The liner plate itself need not be changed, because it usually out-wears the heavily punished lifting edge.

USS Lorain Rolled Steel Plate Lining is made of Carnegie-Illinois Controlled high carbon steel. Its strength permits linings of reduced thickness and weight. Consequently the capacity of the mill for grinding purposes is proportionally increased, in both weight and volume.

Your present mills can be relined with USS Lorain Rolled Steel Plate Lining. It is easy to install. It can be adapted to the size of the mill, type of grind, and size of grinding balls used. Our experienced engineering staff will gladly study your grinding mills and problems. They will make specific recommendations for the use of this long-lasting, efficient lining in your grinding mills.

U·S·S LORAIN ROLLED STEEL PLATE LINING

CARNEGIE-ILLINOIS STEEL CORPORATION

Lorain Division *Johnstown, Pa.*

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*

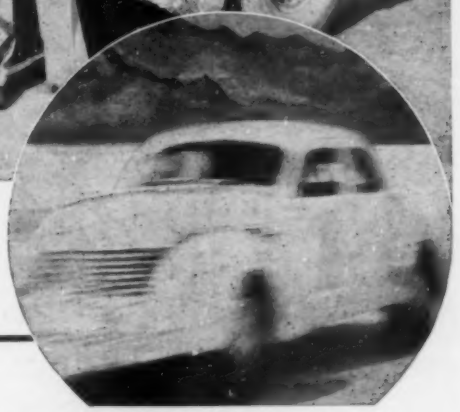
United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

GULF DEPENDABILITY PROVED! ON UTAH SALT BEDS

★ ★ ★ ★ ★

87 world and international speed records were smashed by Ab Jenkins in his powerful racing car shown above—raising world's unlimited 24-hour record to average of 157.27 m.p.h. He also broke the 1-hour record at a speed of 177.05 m.p.h.



Car driven by Ab Jenkins photographed while breaking 36 "unlimited" and 36 "Class C" stock closed car records—all well above 100 m.p.h. For 24 hours he averaged 101.72 m.p.h.

Ab Jenkins sets 159 new speed records.... using Gulfpride Oil and No-Nox Ethyl Gasoline

(Supervised and timed by the Contest Board of the American Automobile Association)

NO special lubricants or fuels were used by Ab Jenkins when he recently hung up 159 new speed records with his big racer and his stock car sedan on the Bonneville salt beds in Utah.

He used the same Gulfpride Oil and Gulf No-Nox Ethyl Gasoline that are giving thousands of car owners new motoring economy and satisfaction every day! *The same gas and oil you can buy for your car from any Gulf dealer!*

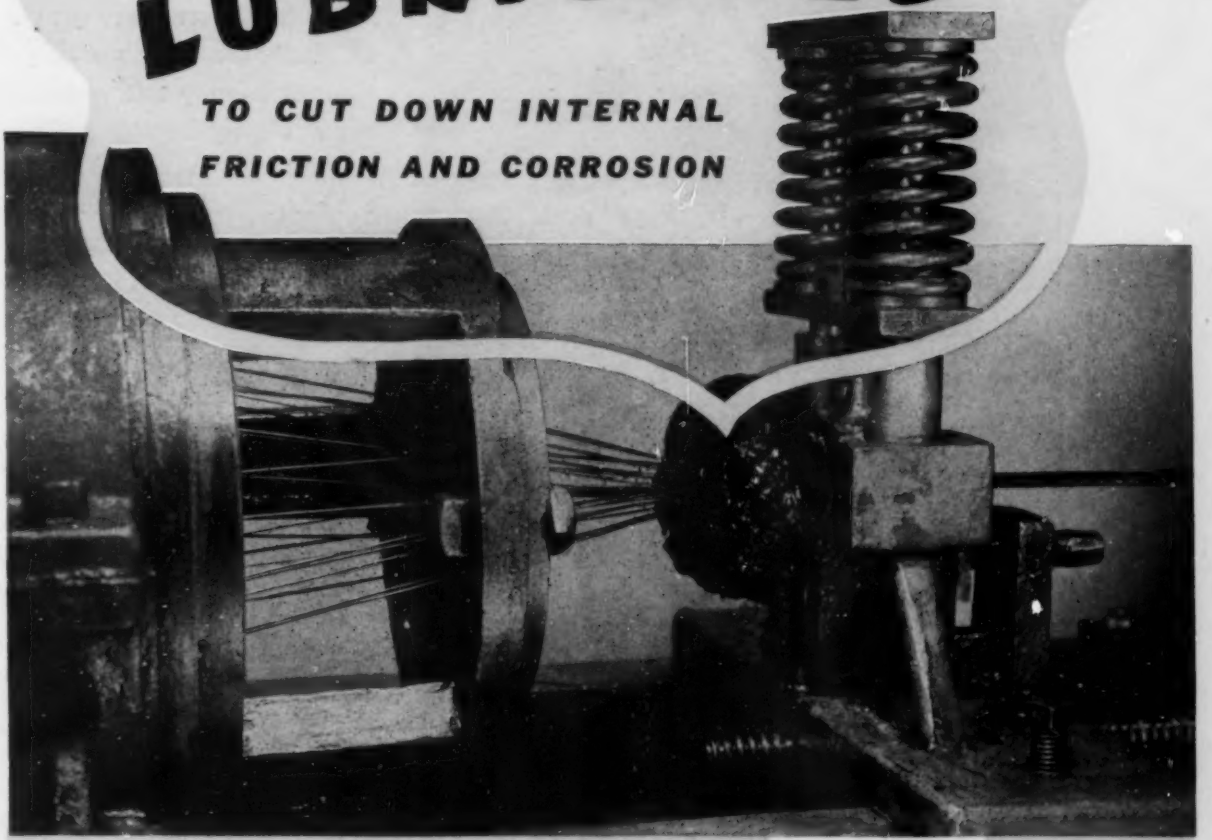
Gulfpride Oil has unique qualities which make it an ideal lubricant for all operating conditions. It is refined by a special process — Gulf's exclusive and patented Alchlor process — which removes 20% more waste, carbon, gum and sludge-forming elements. The result is an oil of greater stability, greater resistance to oxidation, better lubricating qualities and longer life.

This same refining process is used in the preparation of Gulf's finest industrial lubricants. Thus, operators of steam turbines, air compressors, Diesel engines and many other types of industrial equipment can secure for their engines and machines the same protection against friction, wear and repair expense that Ab Jenkins received from Gulfpride Oil when he made 159 new speed records in Utah. GULF OIL CORPORATION · GULF REFINING COMPANY, GENERAL OFFICES, PITTSBURGH, PA.

GULF INDUSTRIAL LUBRICATION

Every Wire LUBRICATED

TO CUT DOWN INTERNAL FRICTION AND CORROSION



● Macwhyte has discovered a way to check two of the greatest wear factors in wire rope — internal friction and internal corrosion.

Each wire passes through heavy lubricant as it enters the stranding die. Wires are completely coated. The lubricant fills the spaces between the wires as they form the strand. High temperatures or freezing weather cannot injure this lubricant. Protected in this way, every wire and every strand resists corrosion and friction — the service life of the rope is extended.

Throughout the operation, emphasis is placed on high quality rather than high tonnage. This is one of the many reasons why Macwhyte PREformed Wire Rope gives such good service.

MACWHYTE COMPANY, Kenosha, Wisconsin • Manufacturers of wire rope and braided wire rope slings • Distributors and stock throughout the U. S. A. for quick service

Monarch WHYTE STRAND PREformed Wire Rope is specially designed for jobs where ropes must stand up under severe bending. Macwhyte manufactures special constructions for shovels, draglines, cableway excavators, scrapers, loaders, mixers, pavers, incline hoists. Macwhyte also makes specially designed non-preformed ropes.

NO. 203

PRE *formed* **MACWHYTE WHYTE STRAND** WIRE ROPE

INTERNALLY LUBRICATED

KOEHRING

Dumptors in sand and gravel plants are daily proving their efficiency and economy as highly flexible material hauling units. Three speeds, forward or reverse, front end instantaneous dumping and short turning radius are important features for high speed travel and easy spotting in restricted plant operating areas.

KOEHRING HEAVY DUTY

Attend 1938 all-star
ROAD SHOW
At Cleveland
EVERYTHING NEW!

KOEHRING COMPANY

Pavers · Mixers · Shovels · Cranes · Draglines · Dumptors · Mud-Jacks
3026 WEST CONCORDIA AVENUE, MILWAUKEE, WISCONSIN

They're Both ahead of their class in drilling speed!

the DA-30

"Introduced in 1937"

the DA-35

"Introduced in 1936"

IT PAYS TO USE

JACKBITS

Jackbits are saving money in mines, quarries, and on contract jobs all over the world. They can do the same for you. Ask for a copy of Booklet No. 2304-A, which contains prices and complete details.

AGAIN Ingersoll-Rand leads the field with another outstanding rock drill—the DA-30. This machine, although in the lightweight drifter class actually has the drilling speed of the conventional middleweight drill. It is designed on the same basic principles as its big brother, the middleweight DA-35, the fastest drill Ingersoll-Rand has ever put on the market. It has all the fine features which have made the DA-35 so popular.

The DA-30 assures a new *high* in drilling speed and a new *low* in cost per foot of hole drilled. Its lightweight, stand-up qualities, perfect balance and easy handling are other features which have contributed to its position of leadership in the drifter drill field.

If you have a rock drilling job, call or write to our nearest branch office listed below.

539-S

Atlanta
Birmingham
Boston
Buffalo
Butte
Chicago
Cleveland
Dallas
Denver
Detroit
Duluth
El Paso
Hartford
Houston
Knoxville

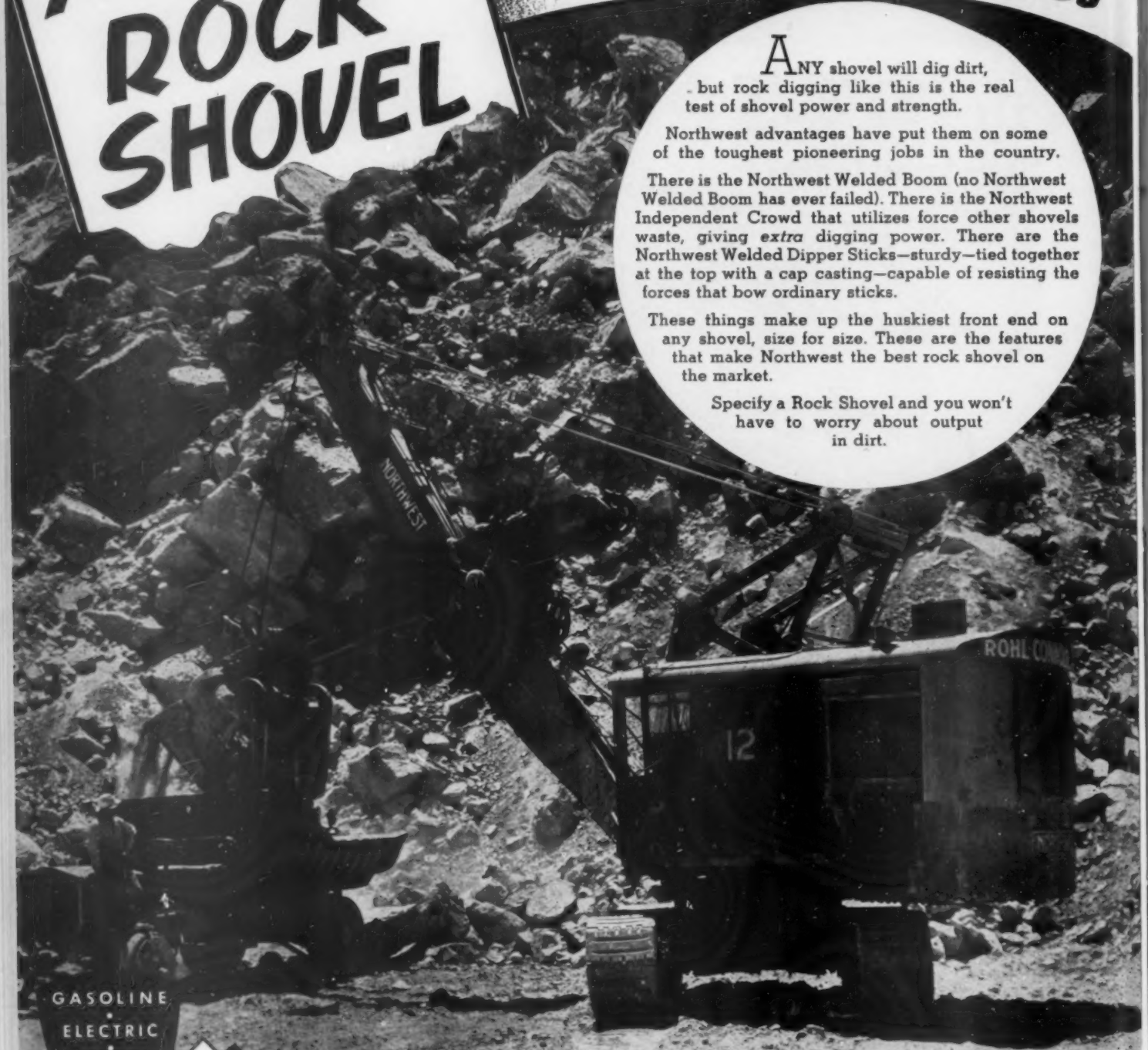
Ingersoll-Rand

11 BROADWAY, NEW YORK CITY

Kansas City
Los Angeles
Newark
New York
Philadelphia
Picher
Pittsburgh
Pottsville
Salt Lake City
San Francisco
Scranton
Seattle
St. Louis
Tulsa
Washington

A Good ROCK SHOVEL

must have good rock shovel features



ANY shovel will dig dirt, but rock digging like this is the real test of shovel power and strength.

Northwest advantages have put them on some of the toughest pioneering jobs in the country.

There is the Northwest Welded Boom (no Northwest Welded Boom has ever failed). There is the Northwest Independent Crowd that utilizes force other shovels waste, giving *extra* digging power. There are the Northwest Welded Dipper Sticks—sturdy—tied together at the top with a cap casting—capable of resisting the forces that bow ordinary sticks.

These things make up the huskiest front end on any shovel, size for size. These are the features that make Northwest the best rock shovel on the market.

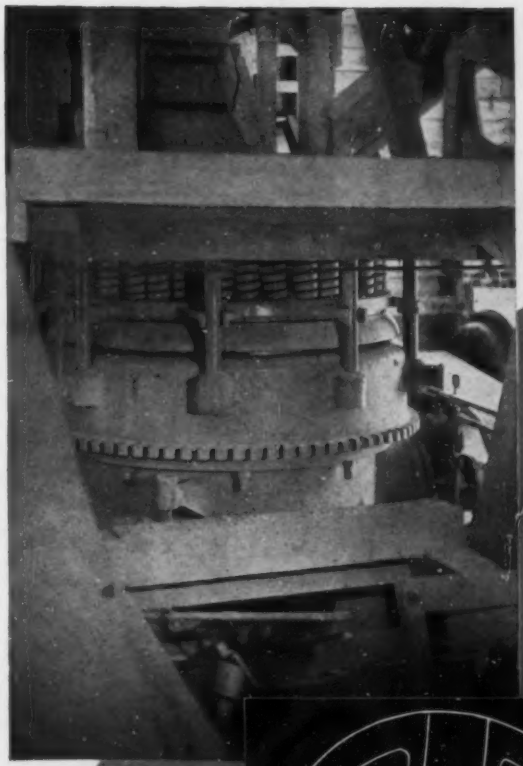
Specify a Rock Shovel and you won't have to worry about output in dirt.

GASOLINE
ELECTRIC
DIESEL
OIL

Built in a range of 18 SIZES 3/8 yd. capacity and Larger

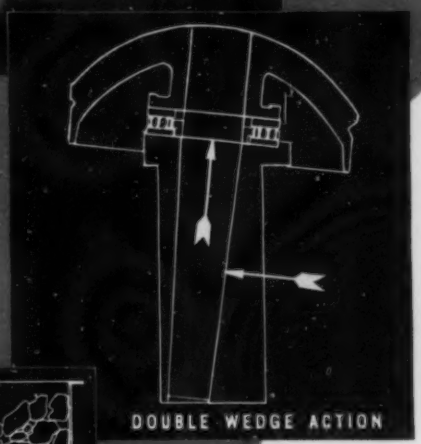
NORTHWEST ENGINEERING CO.
1727 Steger Bldg. · 28 E. Jackson Blvd. · Chicago, Ill.

NORTHWEST



This 48 in. Telsmith Gyrasphere Crusher crushes ore to minus ¾ in. in the custom mill of the Cripple Creek Mining and Milling Co., Cripple Creek, Colorado.

The Only SECONDARY CRUSHER WITH THE Double Wedge CRUSHING ACTION



Working at choke feed, the Telsmith Gyrasphere Crusher not only turns out an enormous tonnage of more cubical aggregate, but crushes finer, with less trouble, less power, and less upkeep.

In the Gyrasphere, *two forces cooperate to produce the most effective breaking action ever developed in any crushing device.* The head is impelled both by the gyrated shaft and a rotary wedge action, produced by the supporting eccentric and roller thrust bearing. The bronze eccentric sleeves are relieved of most of the load—pressures being diverted downward to the massive roller thrust bearings which wear evenly and last indefinitely.

The Gyrasphere takes an unregulated and unlimited choke feed. That means steady, reliable, economical, effective reduction capacity.

Double protectors . . . four flexible leather labyrinth seals plus two piston rings . . . reduce both oil consumption and maintenance expense to a minimum never attained in any other crusher.

Write for Bulletin Y-11

SMITH ENGINEERING WORKS
508 E. CAPITOL DRIVE MILWAUKEE, WIS.

50 Church Street, New York City
201 N. Wells, Chicago, Ill.
1013 Commercial Trust Bldg., Philadelphia, Pa.
81 Binney Street, Cambridge, Mass.
412 Westinghouse Bldg., Pittsburgh, Pa.
Brandeis M. & S. Co., Louisville, Ky.

Associates in Canada: Canadian Ingersoll-Rand Co., Ltd., Montreal, Toronto, Winnipeg, Vancouver

YC-11

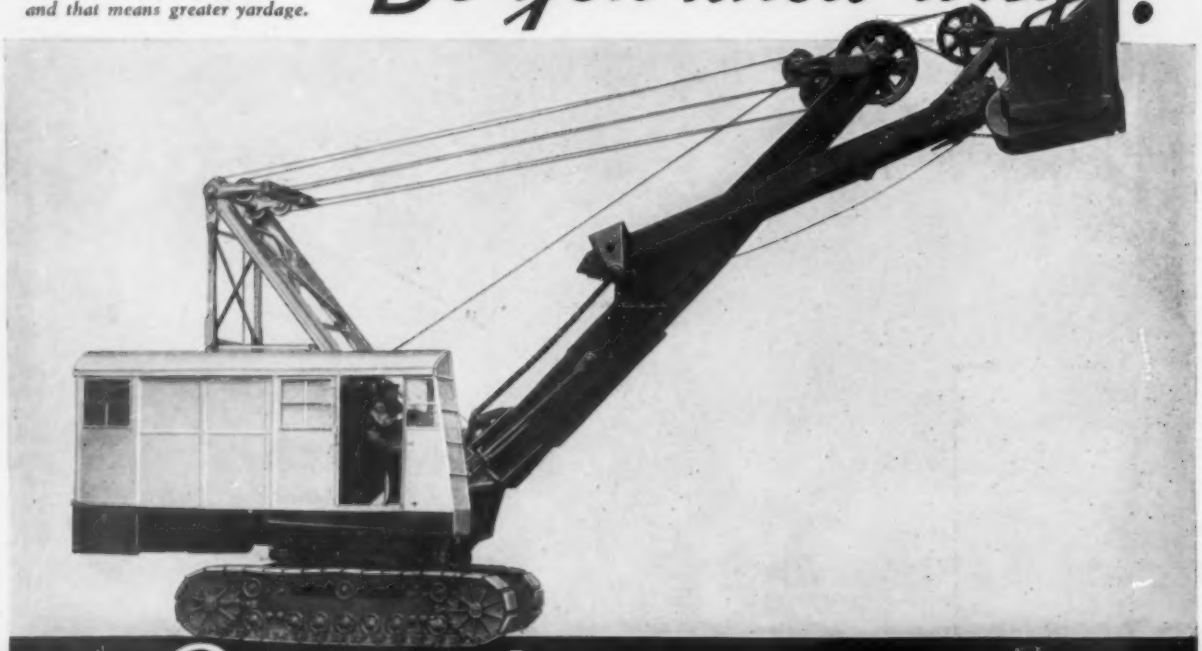
TELSMITH GYRASPHERE

A. B. INNIS

Digging cycles are shorter—you get more passes of the dipper per shift and that means greater yardage.

IT'S THE FASTEST 2½-YD. SHOVEL EVER BUILT

Do you know why?



P&H Pacemakers—FASTER ON THE JOB

● You only have to *see* the design of this modern excavator to understand why it's so much faster. It's *simpler;* built of tough alloy steels, all-welded from upper deck to crawler frames; *stronger,* to withstand the strain of higher digging speeds; *faster,* because there's no cumbersome dead weight—no waste of power. This advanced machine guarantees you real dirt-moving profits for years to come. But why not get the whole story? It's ready for you in Bulletin X-21 which describes the Model 955. Where shall we send your copy? Address the Harnischfeger Corp. 4465 West National Avenue, Milwaukee, Wisconsin.

HARNISCHFEGER CORPORATION

EXCAVATORS • ELECTRIC CRANES • ARC WELDERS P&H HOISTS • WELDING ELECTRODES • MOTORS

FULLER

FEEDERS

for pulverized fine, crushed, or granular materials

Prove their efficiency

"Action speaks louder than words" Likewise orders, installations, and satisfied operators tell a story more convincing than numerous arguments we might put forth in this advertisement.

During the past few months Fuller Rotary Feeders have been installed in many cement plants throughout the country. Result -- only the highest words of praise for the satisfactory performance and savings secured from their reliability in continuous service under the most adverse installation conditions.

A few recent installations

No. 1

16 Feeders — Raw material kiln feed
9 Feeders — Pack-house circulation control
6 Feeders — Raw material blending

No. 2

12 Feeders — Raw material kiln feed

No. 3

11 Feeders — Tube mill feed
4 Feeders — Raw material blending

No. 4

8 Feeders — Raw material blending

We welcome the opportunity to confer with you on any problem you may have regarding feeding of pulverized, fine, crushed, or granular materials.

FULLER COMPANY
CATASAUQUA, PENNSYLVANIA

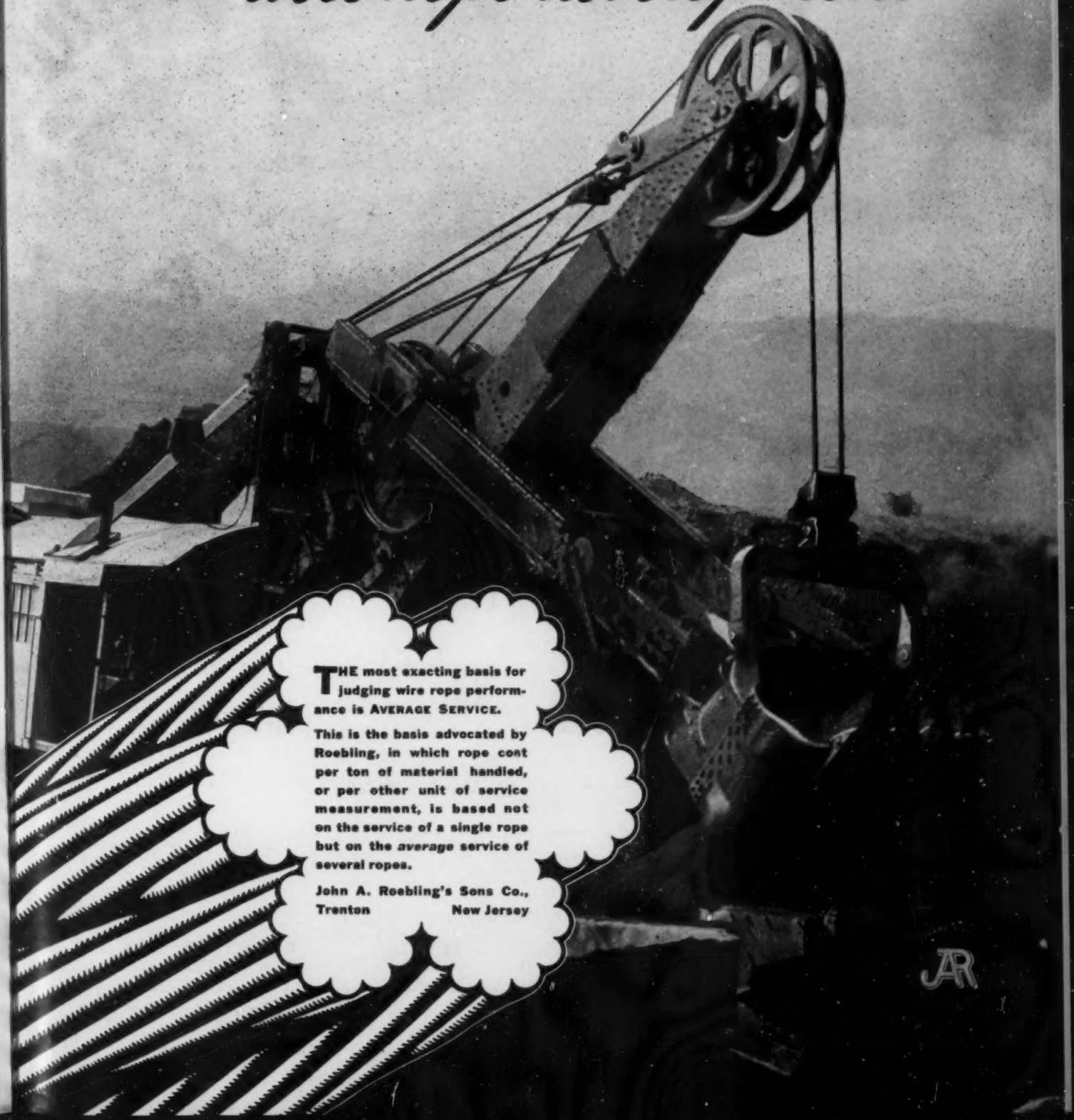
Chicago: 1118 Marquette Bldg.
San Francisco: 320-321 Chancery Bldg.

F-3

FULLER-KINYON, FLUXO, AND AIRVEYOR CONVEYING SYSTEMS · · · · ROTARY FEEDERS AND DISCHARGE GATES
ROTARY AIR COMPRESSORS AND VACUUM PUMPS AUTOMATIC BATCH WEIGHERS · · · BIN SIGNALS

Roebling...

The pacemaker in wire rope development



THE most exacting basis for judging wire rope performance is AVERAGE SERVICE.

This is the basis advocated by Roebling, in which rope cost per ton of material handled, or per other unit of service measurement, is based not on the service of a single rope but on the *average* service of several ropes.

John A. Roebling's Sons Co.,
Trenton New Jersey

ALL WIRE ROPE CONSTRUCTIONS ARE MADE IN

WISSCOLAY PREFORMED

Select the Rope that Fits Your Job

In preformed rope as in non-preformed, every wire rope design feature... such as number of wires and relative sizes in each strand... number of strands... length of lay... direction of wire twist... direction of lay... type of center... kind of wire... each is planned to resist a given type of destruction. Longest rope service is had by properly selecting the type and size of rope for particular use. In order that users of Wickwire Spencer Wire Rope may enjoy the economies of preformed rope to the fullest extent, Wisscolay Preformed is made in every size and type. Let us know your requirements and we will recommend a Wisscolay Preformed Wire Rope that will give you the longest possible life.

• •

WICKWIRE SPENCER STEEL COMPANY, *General Offices:* 41 East 42nd Street, New York. *Sales Offices and Warehouses:* Worcester, New York, Chicago, Buffalo, San Francisco, Los Angeles; *Export Sales Dept.:* New York.

WICKWIRE SPENCER SALES CORPORATION, New York, Chattanooga, Tulsa, Portland, Seattle.

WIRE ROPE
by Wickwire Spencer

WICKWIRE SPENCER STEEL COMPANY
41 East 42nd St., New York City
Please send me my free copy of your popular, new money saving manual, "Know Your Ropes".

Name_____

Firm_____

Address_____

City_____ State_____ R.

He timed 48,000 shovel cycles

...and proved the increased hourly production of BETTER BLASTING—

Are you interested in facts and figures which definitely demonstrate that better blasting is more profitable blasting?

Here's what one engineer found:

	Load	*Swing*	*Dump*	*Return*	*Total Cycle*
Rock Well Blasted	9.6	5.5	2.6	6.1	23.8
Rock Poorly Blasted	15.9	6.5	5.1	6.5	34.0

And . . . it all sums up to this: "Poor blasting reduces the actual average rate of production *at least 12 cubic yards per hour!*"

It isn't necessary for *you* to time 48,000 shovel cycles—or even a single shovel cycle—to better your blasting and better your profits.

Just take time to consult the Atlas Representative. You'll find him well qualified to recommend the explosive best suited to *your* job. Address the Branch Office nearest you for prompt attention.

ATLAS POWDER COMPANY, WILMINGTON, DEL.

Cable Address—Atpowco

Everything for Blasting

OFFICES

Allentown, Pa.	Joplin, Mo.	New Orleans, La.	Pittsburgh, Pa.	Spokane, Wash.
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Butte, Mont.	Knoxville, Tenn.	Philadelphia, Pa.	Salt Lake City, Utah	Tamaqua, Pa.
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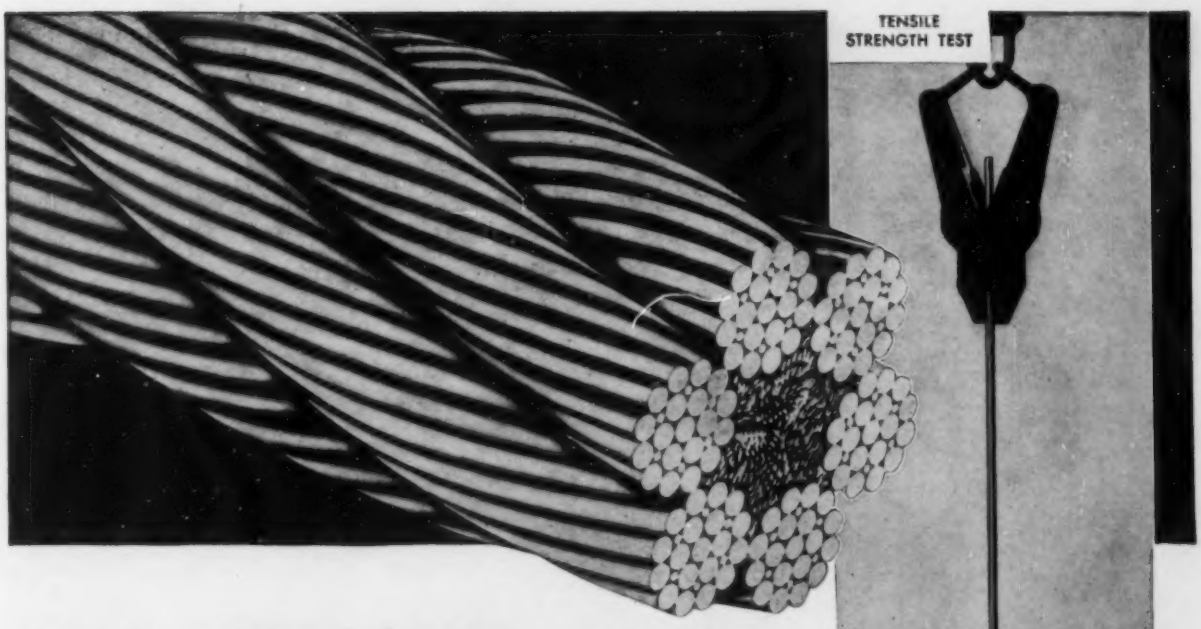
ATLAS

EXPLOSIVES

CHEMICALS ATLAS EXPLOSIVES



WE TESTED THIS 450 TIMES

To prove its Quality

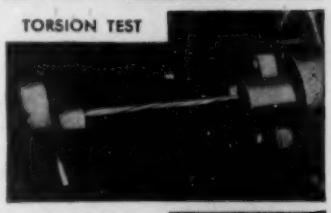
JUST as each part of a well built machine* must be tested individually before it is accepted, so each individual wire in American Tiger Brand Wire Rope is tested at least 3 times, in addition to test for size, before it can pass to the stranding machines.

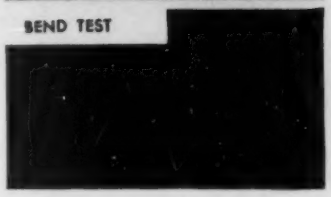
Your work puts wire rope to the severest tests. It must string or reeve easily and quickly . . . spool well . . . avoid whipping at high speeds . . . take the terrific jerks of starting and stopping.

And it is these qualities in American Tiger Brand Wire Rope which have given it a dominant position in the field—qualities which have been built into it by engineers whose wealth of experience is backed by over 100 years of wire making.

American Tiger Brand Wire Rope is available in either Standard (non-preformed) or Excellay (preformed) constructions.

***USS American Tiger Brand Wire Rope is a machine, more depended on than many. It fits the definition "Any combination of mechanism for utilizing or applying power."**





American Tiger Brand Wire Rope. Electrical Wires & Cables. Amerclad All-Rubber Cables. Aerial Tramways. Tiger Wire Rope Slings. Tiger Wire Rope Clips.

AMERICAN STEEL & WIRE COMPANY
Cleveland, Chicago and New York

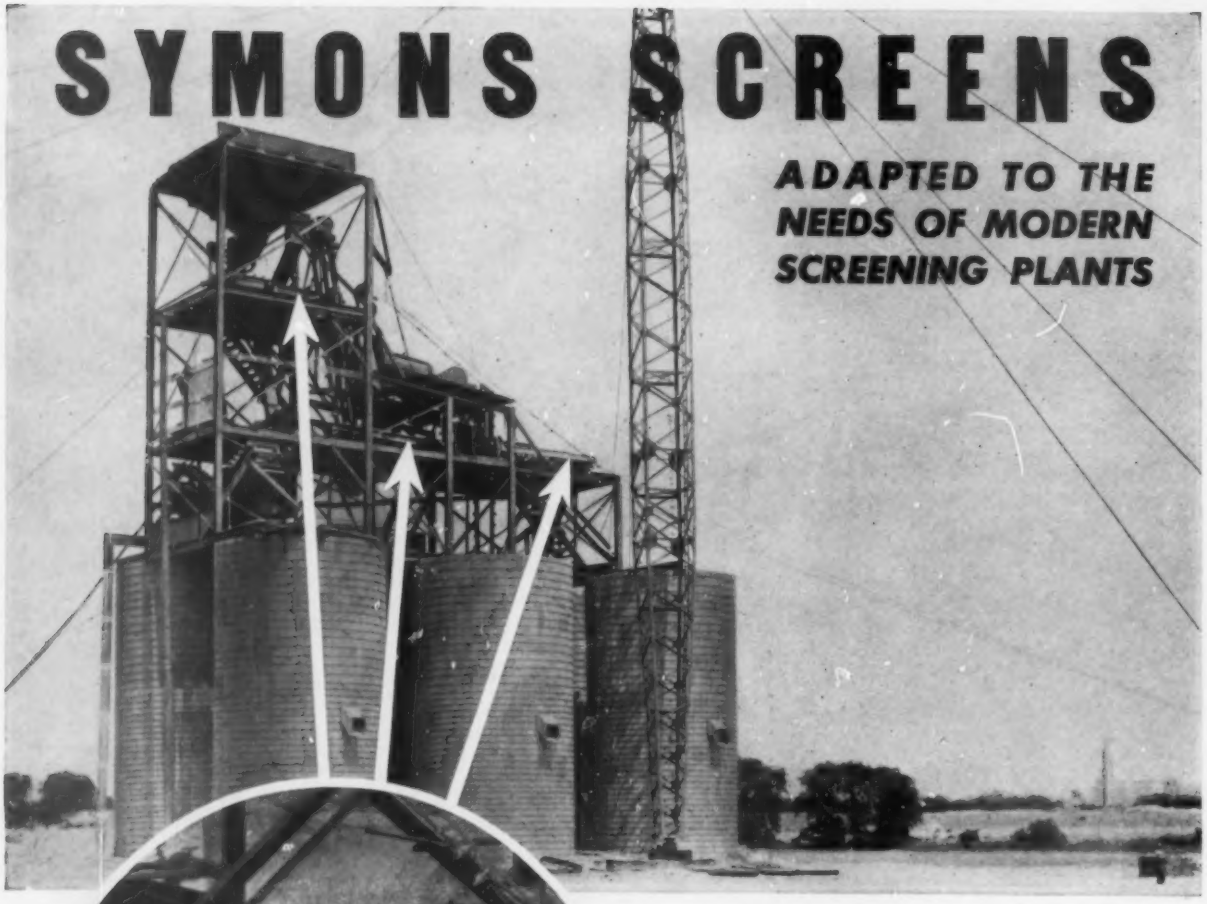
COLUMBIA STEEL COMPANY
Russ Building, San Francisco

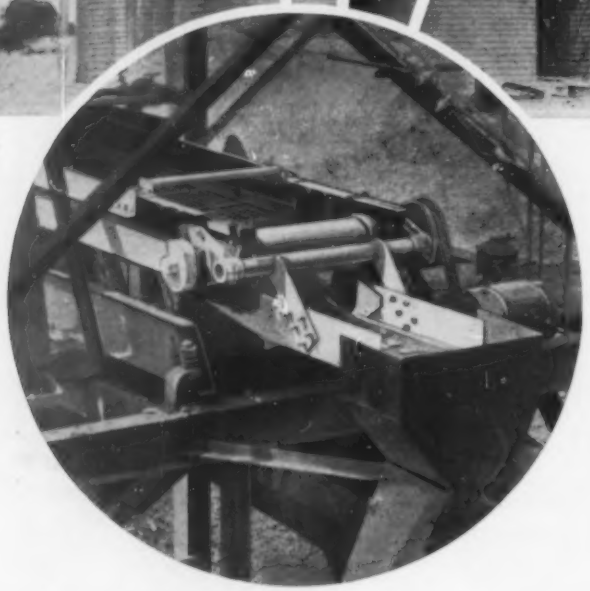
United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

SYMONS SCREENS

ADAPTED TO THE NEEDS OF MODERN SCREENING PLANTS





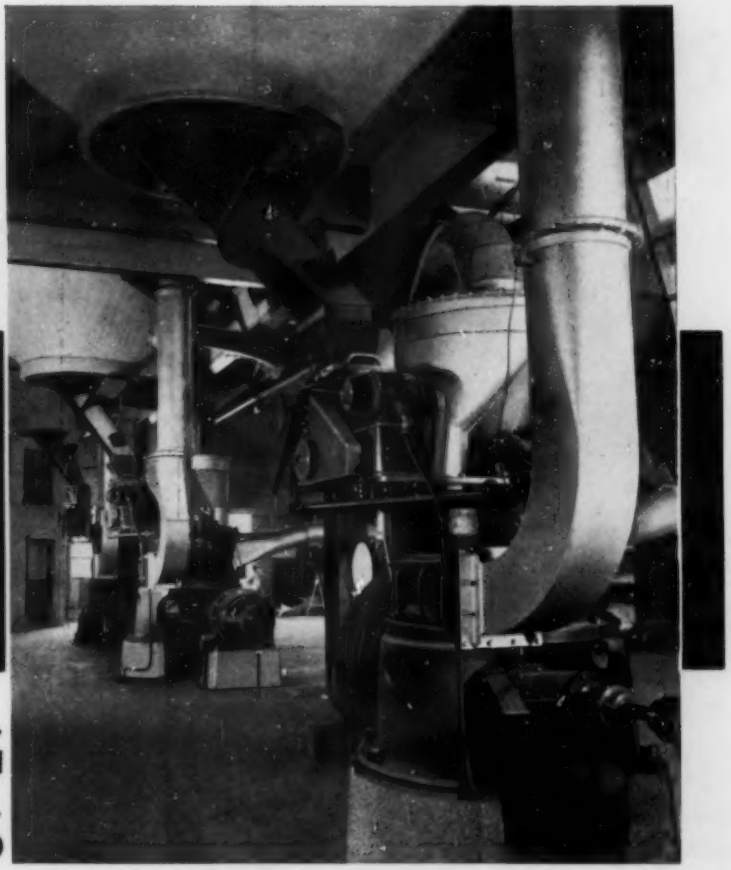
In addition to the 3′ x 8′ double deck Symons screen with vibrating discharge shown above, there are two more Symons Screens installed here—2′ x 6′ and 3′ x 12′, both double deck.

Many innovations in design and construction are to be found at the new gravel plant of the Crown Building Supply Company at Columbus, Ohio. In keeping with its modern features, three Symons Screens were chosen for the screening operations. With these flat screens, it is possible to secure the closer sized and better washed materials as are specified today, furthermore, being placed level, they materially reduce headroom, building height and construction costs. With a definite trend toward flat screening, Symons Screens have many advantages of interest to those contemplating a new plant or a modernization program.

NORDBERG MFG. CO. MILWAUKEE WISCONSIN

NEW YORK 60 E. 42ND ST. | LOS ANGELES SUBWAY TERM. BLDG. | TORONTO CONCOURSE BLDG. | MEXICO CITY EDIFICIO COOK | LONDON BUSH HOUSE

FOUR BOWL MILLS



DIRECT FIRING CEMENT KILNS

IS the cement industry **sold** on the Bowl Mill method of firing Rotary Kilns?

Definitely **yes,** say operators and engineers, who are consistently specifying Raymond Bowl Mills for modernizing plants throughout the country. You can check up on the outstanding projects in the cement field . . . if they are the latest word in construction and equipment, you can be sure they use Bowl Mill Firing.

Write for copy of Bowl Mill Bulletin

The installation shown above is in the Midwestern Plant of a nationally known concern.* Each of the four kilns is direct-fired by individual Bowl Mills, each unit pulverizing about 6600 lb. of coal per hour. This method replaces the former central bin system at a big saving in costs and with greatly increased capacity.

In its various other plants, this company operates Raymond Bowl Mills for firing kilns and uses Raymond Mechanical Air Separators in closed circuit with grinding mills for classifying cement . . . ample evidence of its efficient methods of production.

RAYMOND BOWL MILL

*If you wish to see the smooth running efficiency of the Raymond Bowl Mill, we will furnish on request the name and location of cement plants using this equipment.

RAYMOND PULVERIZER DIVISION
1307 North Branch Street, Chicago
COMBUSTION ENGINEERING COMPANY, INC.
Offices in Principal Cities
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FULL WELDING ECONOMY IS *Sure*

. . . when you repair or build-up wearing parts with

TISCO TIMANG*

AIR-TOUGHENING NICKEL MANGANESE STEEL WELDING ROD

Be *sure* TIMANG Welding Rod is used for your winter repairs . . . or for any manganese or carbon steel part that is built-up or welded. Thus you *assure* tough, strong welds with maximum resistance to wear. The reasons are obvious:

When you weld with TIMANG you get the correct amount of manganese *into* the weld. Thus each TIMANG weld possesses the strength, toughness and wear-resistance of manganese steel. And TIMANG flows freely, doesn't bubble, and requires no water quenching.

TIMANG is the original air-toughening manganese steel welding rod . . . developed in the TISCO laboratories . . . and now used as standard by mines and quarries because of its economy and long, satisfactory wear. Be sure to get full data on TIMANG, as well as on TISCO APPLICATOR BARS and TISCO HARD SURFACING ELECTRODES. Write today.

*"TIMANG" (a registered trade mark) Steel is patented in U. S. A. and foreign countries.

When they're worn out, be sure each wearing part is replaced with one made of genuine TISCO manganese steel. But if it's possible to repair, use TISCO TIMANG for all parts including:

DIPPER TEETH
CONCAVES
MANTLES
HAMMERS
CRUSHER PARTS
ELEVATOR BUCKETS
CONVEYOR PARTS, ETC.

TAYLOR-WHARTON IRON AND STEEL COMPANY

HIGH BRIDGE, NEW JERSEY

PLANTS AT HIGH BRIDGE, N. J.—EASTON, PA.

Offices:

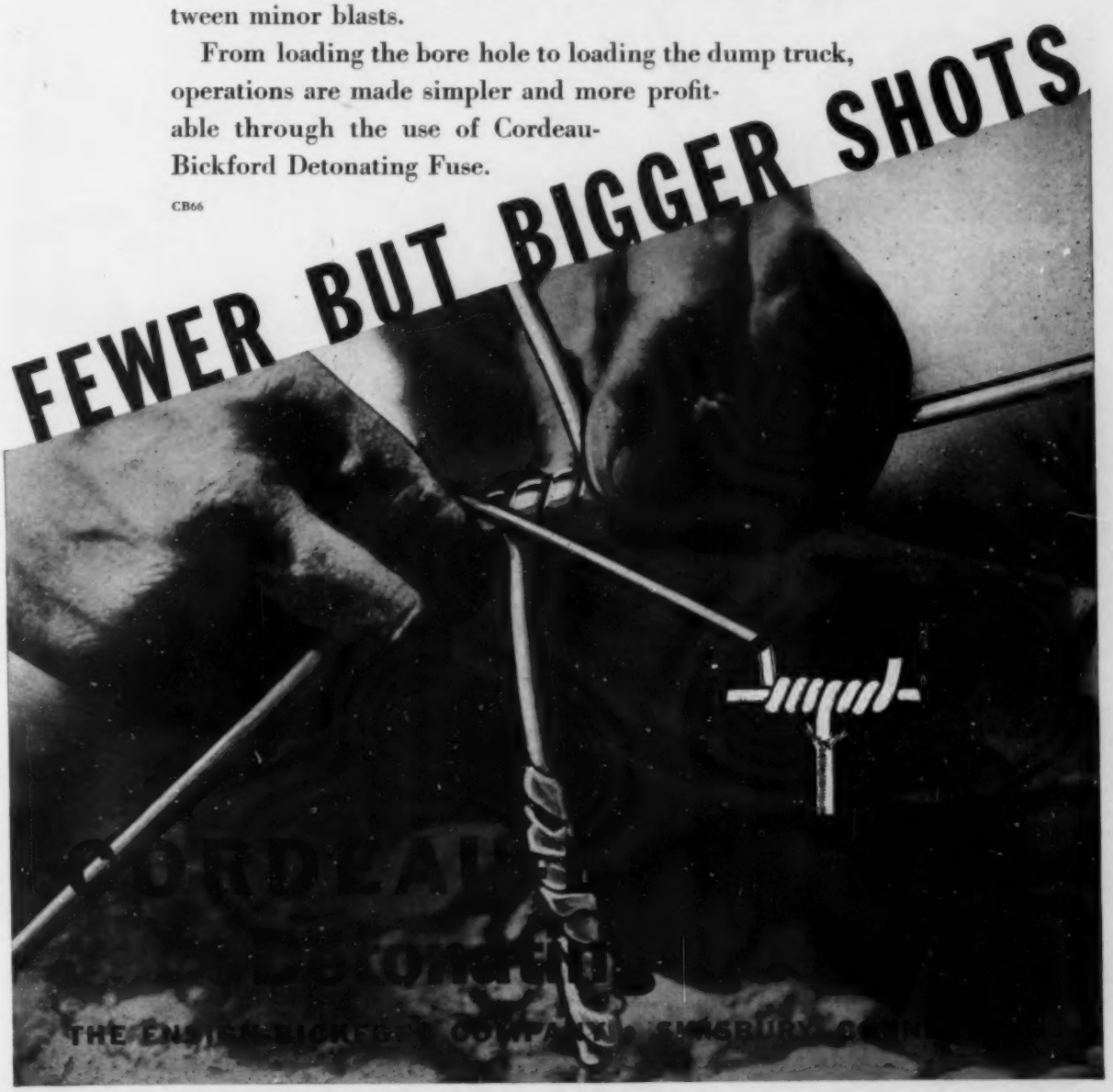
BOSTON • CHICAGO • CLEVELAND • CHARLESTON, W. VA. • DETROIT • NEW YORK • PHILADELPHIA • PITTSBURGH • SAN FRANCISCO • SCRANTON

Equipment Moved Less Often

Detonation of charges with the use of Cordeau-Bickford Detonating Fuse is so complete and so dependable that there is almost no limit to the size of the blast, the depth of the holes, or the intricacy of the hook-up. There is an obvious saving in keeping the drills, compressors, lines, and other equipment on the job until all the holes are ready to be fired at one time. And there is a further saving in keeping the removal equipment continuously at work without having to move it back and forth between minor blasts.

From loading the bore hole to loading the dump truck, operations are made simpler and more profitable through the use of Cordeau-Bickford Detonating Fuse.

CB66



Wire Rope and Strand

now products of Bethlehem

WITH the recently-announced acquisition of Williamsport Wire Rope Company by Bethlehem Steel Company, Bethlehem becomes a manufacturer of wire rope and strand.

For years the name Williamsport has been identified with dependable wire rope and strand. Not only to men who have been using Williamsport products, but to all other wire rope and strand users, Bethlehem's entry into this field marks an important forward step.

As Williamsport Wire Rope becomes Bethlehem Wire Rope, customers of Williamsport Wire Rope Company can look with assurance to Bethlehem to maintain the quality standards associated with Williamsport products. Advantages to the user may naturally be expected to accrue from the broader manufacturing and servicing facilities offered by the Bethlehem organization.

Customers of Bethlehem Steel Company can now obtain a complete line of wire rope and strand from the same source which furnishes their other steel requirements, and made to the same quality standards as those that govern in the manufacture of Bethlehem alloy and tool steels, plates, sheets, and other products.

Wherever and however you use wire rope and strand you will find Bethlehem a source of well-made, dependable material, serviced by men whose long, first-hand experience in analyzing and solving wire-rope problems is a background for authoritative recommendations on the most suitable grade of Bethlehem Wire Rope for any task.

BETHLEHEM STEEL COMPANY

IMPREGNABLE!

In the Allis-Chalmers Seal-Clad Motor the wound stator receives impregnating treatment, similar to the conventional type of winding. Then a Moulded Shield of high dielectric and mechanical strength is fitted into a machined slot in the stator frame and tightly sealed into position with a special compound—thus giving complete protection to the coils.

This feature makes Allis-Chalmers Seal-Clad Motors impregnable to metallic dust, grit, oil, moisture, chemicals and other agents destructive to motor windings.

One or more of these destructive agents are present in every plant, to a greater or lesser degree . . . so why take a chance?

If your plant conditions are severe, the ultimate in motor protection is essential to you—Allis-Chalmers Seal-Clad Motors offer the ultimate in motor protection. If your plant conditions are not so severe as to make this protection absolutely essential, Allis-Chalmers Seal-Clad Motors are still the soundest investment you can make, BECAUSE YOU ARE GIVEN THIS GREAT ADDITIONAL PROTECTION AT NO ADDITIONAL COST.

For further details, write today for Leaflet No. 2182.

The Allis-Chalmers Mfg. Co. builds standard motors of every type from 1 hp. up—also motors for special application.

MOTOR DIVISION

ALLIS·CHALMERS

MILWAUKEE WISCONSIN

GAYCO

Centrifugal AIR Separator

This new unit is deserving of the serious consideration of every operator interested in the increased capacity of all types of grinding mills.

The new GAYCO Centrifugal Air Separator will separate practically all dry fine materials including many that are too sticky to be screened.

The principle of rejecting the coarse particles by means of an adjustable centrifugal sizing fan is an exclusive GAYCO feature.

We also manufacture Bucket Elevators—Bin Gates—Belt Conveyors—Feeders—Grizzlies—Rock Crushers—Revolving Screens and furnish complete crushing, screening and washing plants for crushed stone or sand and gravel.

Let our engineers give you the benefit of their many years' experience. Ask them how the GAYCO Centrifugal Air Separator can pay for itself in your plant.

Universal Road Machinery Co.

MAIN OFFICE AND FACTORY KINGSTON, N. Y.

LABORATORY KINGSTON, N. Y.

GAYCO

RUBERT M. GAY - DIVISION
114 LIBERTY STREET
NEW YORK, N. Y., U. S. A.

GAYCO

"GAYCO" CENTRIFUGAL SEPARATORS

"RELIANCE" CRUSHING, SCREENING AND WASHING EQUIPMENT

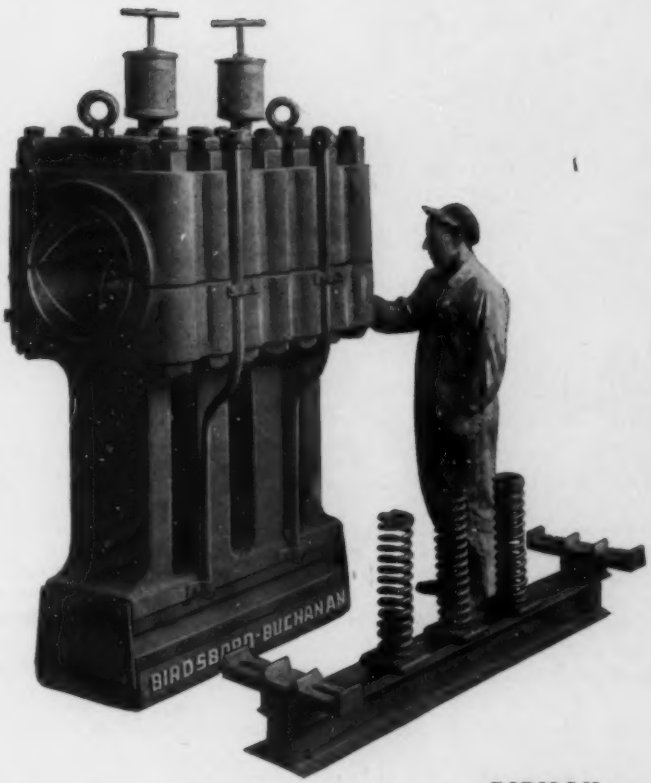
This PITMAN helps to assure trouble-free crusher operation

TO overcome many of the troubles common to jaw crushers, the Birdsboro-Buchanan Type C. Jaw Crusher is equipped with this specially designed, water-cooled Pitman.

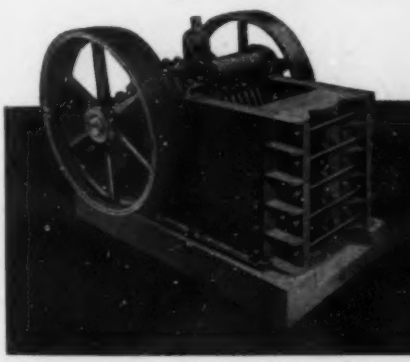
It prevents the crusher from running hot and makes the bearings last two to three times longer. Years of highly satisfactory service under all sorts of operating conditions have proved the value of its design and construction. Made of a special Birdsboro Alloy Steel and heat treated, this Pitman combines greater strength with lighter weight. The mechanical leverage employed imposes comparatively little pressure upon the bearing of the Pitman. This reduces bearing wear, and because it runs cool, rebabbiting is not required as often as in the case of other types.

In addition to having a water-jacketed cap, the Pitman has another exclusive Birdsboro-Buchanan feature. Its weight is "floated"—that is, taken up by heavy springs at the end of the downward strike. Here again, wear is lessened and the crusher frame and foundation is relieved of shock and vibration.

For full details on the construction of Birdsboro-Buchanan Crushers, write for Bulletin No. 110. Thirty years of experience in dealing with crusher problems is at your service without charge or obligation.



PITMAN
OF BIRDSBORO-BUCHANAN
TYPE C. JAW CRUSHER



BIRDSBORO-BUCHANAN
Crushing Machinery Division of
BIRDSBORO STEEL FOUNDRY & MACHINE CO.
90 West Street — New York, N. Y.
Represented in Canada by — Fraser & Chalmers of Canada, Ltd.
1411 Crescent St., Montreal, Que. — G. E. Sancton, Gen. Mgr.

TONNAGE

Sharp reduction in tonnage costs . . . cheaper handling of rock products . . . that's what HEWITT conveyor belt can achieve for you. It is a matter of fact that wherever the choice of conveyor belt is decided by handling cost per ton, HEWITT is usually selected. For built into every HEWITT conveyor belt are the longer life, extra stamina and added toughness to fight off punishing use. That's the result of superior workmanship and advanced design. You'll find that a HEWITT conveyor belt can give you astonishing performance. You'll get dependable, unfailing service day in and day out that will bring tonnage costs lower and lower. If you want lower operating costs, those are dollars-and-cents facts that make HEWITT conveyor belt worth looking into.

HEWITT

RUBBER CORPORATION

BUFFALO, NEW YORK

HOSE • CONVEYOR AND TRANSMISSION BELTS • PACKING

Rock Products

Vol. 40 Chicago, November, 1937 No. 11

Collecting and Interpreting the News

FAR REMOVED from his editorial sanctum where his files of "suggestive" material are kept, the editor of necessity must devote his comment to items and suggestions gained on an extensive trip East. We hope the readers will benefit by the change.

We have heard the present administration at Washington and its executive damned in such a variety of unprintable language that we will not attempt to interpret industry reaction to recent developments, including the call to reassemble Congress to pass more reform legislation. It's hardly necessary.

Philadelphia Inquirer of October 24, that "we possess today every ingredient making for prosperity, except one,

Only too obvious is B. C. Forbes' contention in the a vital one, namely, faith in the Federal government, faith in its policies affecting business, faith in its ability or will to put public finance on a sound basis, faith that a square deal will be meted out to labor and employers alike."

Yet we think that altogether too much attention is focused on Washington, D. C., and the play acting that is going on there. We haven't found any one who really believes the United States of America is going to hell, although there are many who believe that is the only suitable place for those now running things at Washington. We don't need faith in the Federal Government. There have been lots of other periods in history when it was lacking. We do need to make practical application of our faith in the United States and its citizens.

Optimism a Habit

It is a pleasure, therefore, to glance through the New York City newspapers of October 24, and note their bulging automobile show supplements with the usual line of hokum about the new season's cars and the prospects of a bigger and better year for 1938. Automobile manufacturers, at least in their public statements, are confirmed optimists. Maybe this is one reason why the industry always leads the return of prosperity.

This optimism is the more noteworthy this year in New York because the city is in the depths of gloom over the recent rapid drop in security prices. There are doubtless many reasons why prices have dropped, but no one has suggested a substantial one, for at the time of its beginning the earnings of corporations promised to be at least equal to those of last year. There is little doubt that the psychological *effect* of falling stock prices is to reduce corporation earnings because it gives corporation directors cold feet and they hold up contemplated construction and rehabilitation of many plants; and sooner or later every one feels the effect of this.

Most of all, the temporary loss of 20 billion dollars' paper value of securities is going to reduce the income of the Federal government itself in 1938, because many big taxpayers will be able to show losses far greater than income. The cheerful side of the picture is that the little fellow is showing his faith in the United States by slowly but steadily absorbing the securities being dumped by his rich neighbors. This odd-lot buying is said to have furnished the only cushion to falling prices; and these little fellows have absorbed 6,000,000 shares in the last few months. The little fellow may not always be a sucker; and we admire his faith, which richly deserves to be rewarded.

Faith in the People

We can think of no more constructive suggestion to American industry than to exhibit a little of the kind of faith that the common people have in it, and be less concerned with the lack of faith in politicians. It's well to remember a recent bit of truth spoken by Elihu Root, Jr., in an address to the students of Hamilton College: "In private life," said he, "men succeed because they are competent, and fail because they are not. In public life, they may get by as fakes and windbags. In the world of fame-hunting foghorn blowers, the pleasure derived from notoriety and publicity seems to be in inverse proportion to the size of the recipient."

Local business men can do much to show up present political hokum. Particularly are the common people as well as business men becoming tax conscious. Already well organized opposition has been successful in preventing diversion of highway taxes to other uses in several states by constitutional amendments. In 1937 such amendments were proposed and considered in 13 states, and in four states these amendments will soon be voted upon by the people.

It is largely a problem of getting the true picture before the people. We believe that if every employer would post a list of the taxes his products have to carry, including if possible the extra cost of equipment and supplies represented by taxes on those commodities, his employes would be able to obtain a much better appreciation of where their company's income was going, and why more of it was not coming to them, than they can get from any other source.

Employers can no longer apply *the heat* to the Federal government, but they can apply it back home where it will do the most good. Only the people themselves can effectively remind Mr. Roosevelt of his own words made in the 1932 campaign speech that "all taxes are paid in the sweat of the wage earner's brow." Surely some of those chickens can be made to come home to roost!

At Last, the Prosperity Formula!

While we are on the subject of the President's words of wisdom, we hope no one missed this gem from his recent "fireside talk": Said he, "a few more dollars a week in wages, better distribution of jobs with a shorter working day, will almost overnight make millions of our lowest-paid workers actual buyers of billions of dollars of industrial farm products. That increased volume of sales ought to lessen the other costs of production so much that even a considerable increase in labor costs can be absorbed without imposing higher prices on the consumer."

We wonder if he really believes that, or whether he merely likes the sound of those phrases! Where are those millions of so-called underpaid? For the most part they are not engaged in production; practically none in large scale production industries. In those industries, when they are operating, the workers have already gained high wages. Those lower-paid workers are largely in the many hundreds of thousands of little businesses scattered over the country, the country stores, the garages and service stations, the little hotels and restaurants; yes, even the small crushed stone and gravel plants. These little businesses exist *only* because they render a small service, or make a small volume of salable commodities, for a small community at a small price and a very small profit. Their labor costs, because of the necessarily small volume of business done, are relatively higher than their big volume competitors outside their local territories.

Increasing the wages of employes of such small business enterprises could not possibly increase their employers' volume of sales materially. Those sales are and always will be limited to local necessities. It might conceivably increase the sales of such luxuries as radios and motor cars, but this would represent but a small volume of all local sales of all commodities.

To make the example more specific, what would happen to the small sand and gravel producer with an average annual volume of sales of say $50,000 to $100,000, or 100,000 tons production? If he is compelled to pay the same wages as his big volume competitor 200 miles away, with this big competitor producing 150 tons per man per day, say, against his 25 tons per man per day, it is obvious that the difference in labor cost alone would permit his big competitor to readily absorb the difference in transportation cost, because the additional 100,000 tons would add very little to the big competitor's cost—as a matter of fact, it would undoubtedly reduce the cost on all his output. Apply that example to those hundreds of thousands of little businesses throughout the country and you have a picture of what will happen if wages and hours—and eventually prices—are fixed by government decree.

It may be, as many big business men possibly believe, that these little fellows are a menace to their own profits and to industry and to an economically sound society, but their abolition "overnight" by the Federal government somehow does not seem consistent with some of Mr. Roosevelt's other remarks that such business men are the backbone of the country. At least those little business men and their employes, who are about to be "liquidated," should be able to express their own ideas about it. As a rule they seem quite contented with their lot in life.

Well, you see, in spite of our introductory paragraph we could not withhold some comment on affairs at Washington, D. C., any more than one of you readers can avoid the subject in the most casual conversation. We only hope our suggestion that the heat be applied at home instead of in Washington falls on a few receptive minds.

New Products, New Uses, New Methods

Charles F. Kettering, vice-president in charge of research, General Motors Corporation, in connection with the usual publicity about the New York automobile show, says: "Research is one thing to which there is no end. It is a trail leading upward, like a mountain road in the wilderness. The higher we climb, the more unexplored territory we can see in front of us," etc. That infers that all research is progress. We wonder.

Research is resulting in some fearful and wonderful specifications for cement. It is getting so that all users of large quantities of cement as well as the Federal government are applying their own conclusions as to the meaning of much confused research in writing specifications that no cement manufacturer knows the why for! It seems to us that each new research merely convinces us that cement is getting punker and punker. What's happened to the men who made cement for the Panama Canal locks and dams, and what's happened to cement since that was made? We have never heard that the concrete made with this cement was so terrible. In fact our impression is that it is far superior to the concrete in many recent dams and structures.

We may be learning more about the constitution of portland *cement*, but quite evidently it is not resulting in better *concrete*. We have learned how to make a more costly product, but not evidently a more useful one. By present standards, much of it being over 40 microns in size, the cement used in the Panama Canal structures was not cement at all! But, by golly, there she is! and some more recent jobs are not much to shout about. Maybe a little reverse research would not be so bad; maybe we'd better search for a cement to make *concrete permanent* instead of one that will harden the fastest.

The concrete pavement that will last 40 years instead of 20 years is a whole lot more economical than the concrete pavement that hardens the fastest. We can't see why we need all this haste in building something designed to last as long as ourselves. It is as inexcusable as dashing around in a car at the risk of our lives to save five minutes. What are you going to do with the five minutes saved!

* * * * * * * * * * *

A new use has been found for glass and rock wool. It is laid on the ground as a blanket or mulch to protect tender plants through a northern winter. It keeps out cold and lets in the sunshine. A new market for a rapidly growing industry.

In The Headlines

Cement Plants Operating On a Five-day Week

The Allentown Portland Cement Co., Allentown, Penn., is doing what most cement manufacturers would have said a few years ago could not be done. It is operating on a 40-hour week with a complete shut down Saturday and Sunday. Other plants have closed down over Sunday, but not for two days. At the Allentown plant, the kilns are allowed to run empty before shutting off the flame, that is, the feed is shut off first and the kiln operated until it is empty. Early Monday morning the fires are again built and the kilns started. So far the kilns have not suffered from loss of linings nor of coatings on the linings, and this practice has been in effect since Labor Day. Ordinarily, it has been assumed that a kiln has to be operated continuously, because it is too expensive to shut it down and fire it up again. Evidently labor demands of time and a half or double time for Saturdays and Sundays are changing industry and old practices.

Wagner-Steagall Bill To Boom Building

Cement and aggregate producers are expected to benefit substantially from the $2,000,000,000 in federal and local funds which are to be expended under authority of the Wagner-Steagall housing bill passed at the last session of Congress. Of this amount, about $800,000,000 will be spent for building materials. It has been estimated that in the period between passage of the bill and July 1, 1938, about $45,000,000 will be spent for materials, but thereafter at least $88,000,000 annually will be spent in the next two years.

Federal contributions will be financed from the sale of bonds of the United States Housing Authority which will mature within 60 years or less and bear interest of not more than four percent. The money will be used to make loans or capital grants to local housing authorities. To secure local interest and cooperation in the eradication of slums and erection of low cost housing to replace old buildings, local housing authorities would be required to provide at least 10 percent of the cost of land acquisition and construction. The local government having jurisdiction over the project would be required to put up 20 percent of the annual rental subsidy in the form of cash, tax remissions or tax exemptions. Loans could be made to local authorities not exceeding 90 percent of the cost of the project. To prevent construction of "luxury" apartments, a maximum room cost of $1,000 and apartment cost of $4,000 was written into the bill. In cities of 500,000 or over, the limit could go to $1,250 per room and $5,000 per dwelling unit.

Fight Unfair Prison Limestone Competition

Midwest Agricultural Limestone Institute recently called upon Mr. A. L. Bowen, Director of Public Welfare, State of Illinois, protesting the delivery of penitentiary-produced stone to private users on township commissioners' orders. To get around the State law, a trucker would get an order from the township commissioner for stone for delivery to some project covered by the law, and then take loads on this order to private purchasers. As a result of these protests, the Department of Public Welfare has issued an order establishing new prices on agricultural limestone produced at the Joliet and the Menard branches of the Illinois State Penitentiary. In carload lots, the limestone will be sold at 90 cents a ton; in wagon lots at $1.00 a ton. Before the issuance of this order, truckers had been selling agricultural limestone for 70 cents a ton.

Kansas Rules on Sand Sales Tax

Kansas State Tax Commission has ruled that although the contract for the sale of sand may be made outside of the State, if the sand is a Kansas product and is sold for delivery in Kansas for use in the State, it is not interstate commerce and the transaction is subject to the sales tax. An example of a transaction of this kind is where the sand may be sold from the Kaw river for sale to a Kansas railroad for use in Kansas, but the purchase was made by the Chicago headquarters.

Lime Outlook Promising

In spite of disturbing business conditions, believed to be of a temporary character, the outlook for the lime industry is promising. The National Lime Association reports that the lime industry has completed one of its most successful agricultural lime seasons for many years, and 1938 is expected to result in even larger sales for this purpose. In the construction market, contracts for the first seven months of 1937 have risen 18.5 percent over the same period in 1938. Rising construction costs undoubtedly have affected the volume of new construction, but offsetting this factor is an accumulating housing shortage. The outlook for chemical lime sales seems equally healthy, particularly for water treatment plans and sewage disposal works.

Opens Drive Against Accidents

Plans are under way by the Portland Cement Association to celebrate the twenty-fifth anniversary of organized safety work in cement mills throughout the country. The program of the Silver Anniversary Safety Committee will be followed up by 2,600 safety supervisors in individual plants supported by 6,000 cement mill employes with service records of 25 years or more. These veterans are leaders in what is known as the Safety Minute Men of the industry.

Col. H. A. Reninger, Allentown, Penn., general chairman of the Silver Anniversary committee, stated in his announcement that in 1911, just before the safety movement started, 15 percent of the men employed in the cement mills were involved in accidents of some kind, while last year less than 1½ percent of the men in the industry had lost-time accidents.

Increased Freight Rates On Cement, Lime, Gypsum

Interstate Commerce Commission granted class 1, railroads on October 22, freight rate increases designed to return about $47,500,000 additional revenue. The industrial minerals producers will help foot the bill to the tune of an additional cent per 100 lbs. on such commodities as cement, lime, plaster, mortar, and gypsum. Although this does not appear to be such a large amount, increases in freight rates on other commodities, such as coal and steel products, will tend to increase the costs of rock products manufacturers and thereby add to the burden imposed by the direct increase in freight rates. Bituminous coal and coke rate increases range from three cents to 15 cents per net ton in the western district, west of Chicago, and from three cents to 10 cents per net ton in other districts. These new freight rates will take effect 30 days after the issuance of the order by the Interstate Commerce Commission.

It has been estimated that the total amount of the increase for lime, cement and plaster will amount to $3,156,281. Considerable criticism has been raised against the railroads for increasing rates on commodities in the hauling of which they face a minimum of competition.

Demand for Various Stone Sizes Necessitates

Ingenious Screening and Crushing Plant

By FREDERICK D. WITMER, JR.

Engr., Ohio Hydrate and Supply Co.

PRESENT DAY SPECIFICATIONS call for stone sizes within close limits making it necessary for the operator who desires to produce stone for various purposes to add modern equipment and exercise his ingenuity to the fullest to provide an operation with the necessary flexibility.

Out of the demand for a multiplicity of stone products and for finer sizings have been developed plants with ingenious screen arrangements. One of these is the stone plant of the Ohio Hydrate and Supply Co., Woodville, Ohio. This plant has been practically rebuilt, progressively, since its erection in 1925; its capacity has been doubled since 1930, and any sized grade of stone, either washed or unwashed, can be readily produced.

Increased capacity of the Ohio Hydrate and Supply plant was necessary due to the demands for various sizes of stone, and the fact that the plant was originally designed to produce the kiln requirements in a 10-hr. day with commercial stone as a by-product, but with the change to the 8-hr. day, higher production of kiln stone per hour was required.

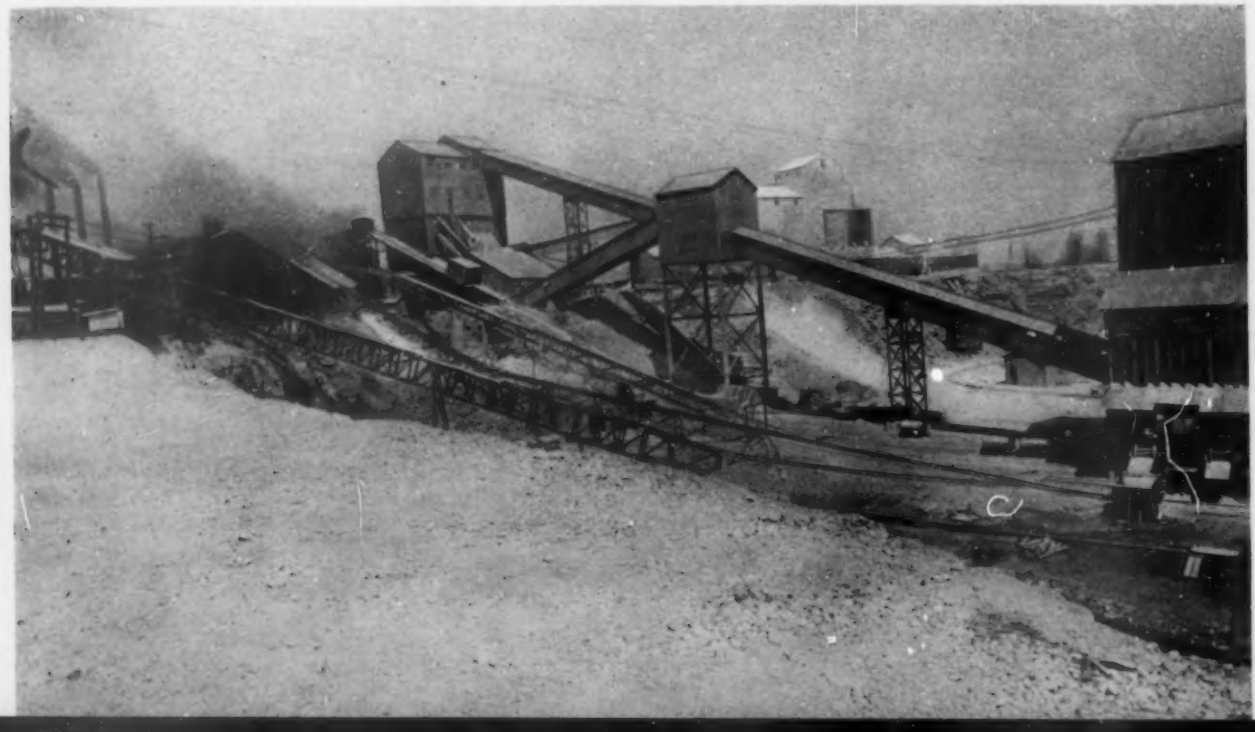
Stone products now made are kiln stone, flux stone, railroad ballast, commercial stone, agricultural limestone, dried agricultural limestone, dried glass sand, asphalt filter and whiting. A number of screens and handling equipment have all been compactly installed in the original stone plant building which was designed to accommodate two revolving screens.

A 50- to 70-ft. quarry face is being worked, and a new level 30- to 40-ft. below the present quarry floor is being started. Broken rock is loaded by a 5-yd. Marion Panama type electric shovel and 1⅞-yd. full revolving Marion. Rock is hauled over industrial, standard gauge track in Easton 8-yd. capacity Phoenix cars to the 60-x84-in. primary Traylor jaw crusher on the quarry floor fed with a 6-ft.x11-ft. Traylor cast steel apron feeder. From the crusher, the rock is elevated by bucket elevator and passed over a roll grizzley for removal of kiln stone.

Efficient Screening

Kiln stone (5- to 9-in.) is drawn from its bins into smaller steel cars and hauled by hoist over the kilns, which

Kiln stone is taken out of screening plant at the right and hoisted on tracks over three banks of vertical kilns. Other stone is moved by the long conveyor to the improved screening plant on the left



Shovel loading settled fines from settling basin into trucks. Screening and crushing plants in the background

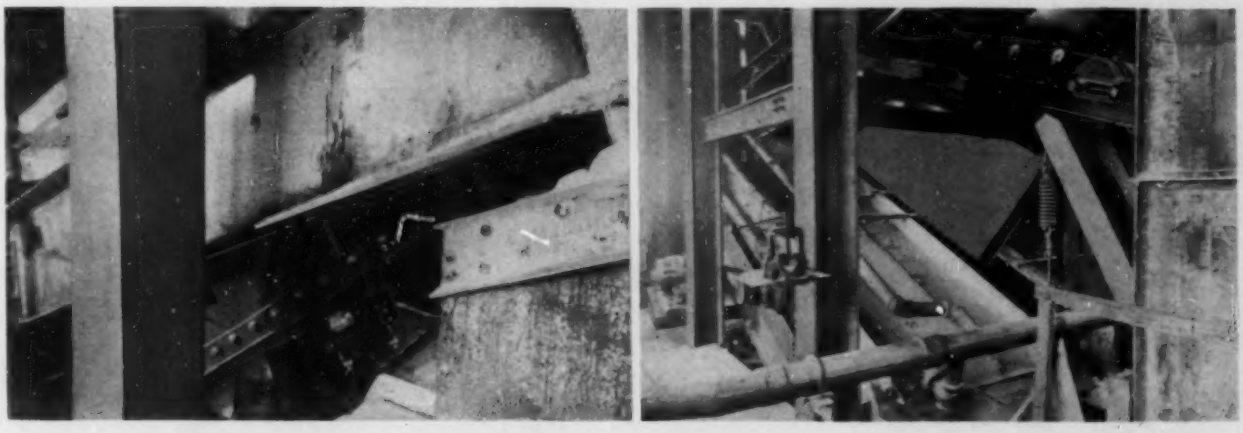
are arranged in three banks and filled from three industrial tracks. All minus 5-in. stone is carried from the bins below the roll grizzley to the recently improved screening plant above the quarry over a 30-in. Robins belt conveyor on 372-ft. centers.

At the top of the plant, the conveyor discharges to a feed box above a triple-deck Tyler-Niagara 5-x10-ft. scalping screen, with 3½-, 2½- and ⅞-in. openings from top to bottom. Oversize (3½- to 5-in.) is chuted from the screen to a 150-ton bin below, which, when full, automatically is chuted to an Austin No. 7 gyratory crusher below. The crusher discharge is carried over a 24-in. belt conveyor to join the 30-in. belt conveyor from the quarry, and is passed over the scalping screen with the fresh stone. The top size is flux stone.

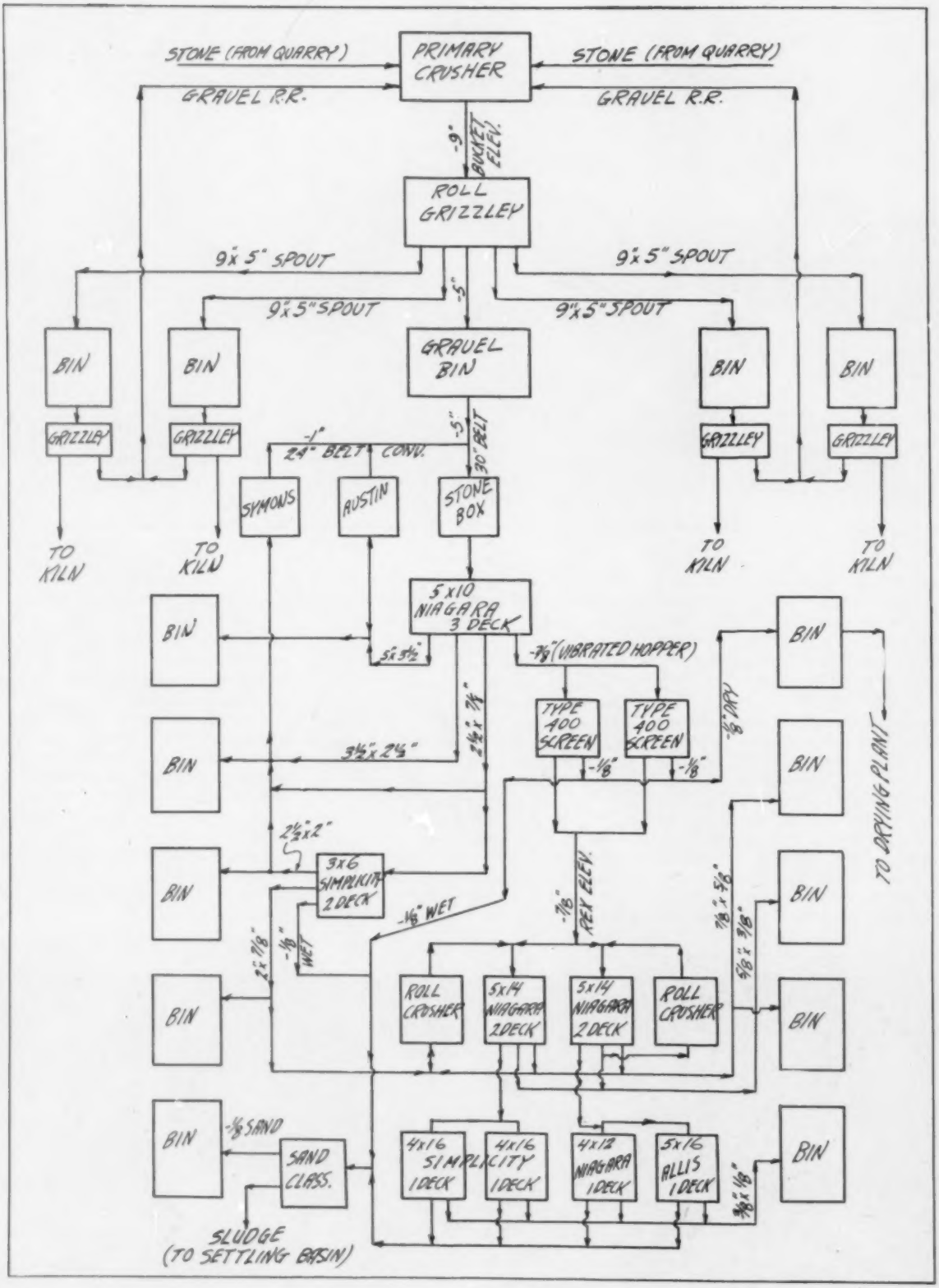
The 2½- to 3½-in. stone (ballast) retained on the second deck is chuted to another 150-ton bin below, or to the gyratory crusher or to a No. 4 Symons cone crusher, crushing to ¾-in. and under. When the Symons cone crusher is operating at capacity, the surplus is routed to the Austin crusher.

The ⅞- to 2½-in. stone (commercial stone) is either chuted to the Symons crusher, and returned to the scalping screen by the long belt conveyor, which carries a circulating load of about 100 tons per hour, or is sent to a 3-x6-ft. double-deck Simplicity screen where either wet or dry separations are made.

The 2- to 2½-in. stone rejections on the 2-in. top deck may pass to a bin, to the Symons cone crusher or to a 24-x30-in. Greenville double-roll crusher. This crusher is set for ⅜-in. and under, for smaller sizes of stone, and discharges to the boot of a totally-enclosed 50-ft. Chain-Belt bucket elevator to sizing screens in the wet washing half of the screening plant. Similarly, the 2- to ⅞-in. stone may be handled to either the Symons or to the Greenville crusher. The ⅛-in. minus stone is flumed to the Wood sand classifier, followed by a twin dewaterer to take out the sand.



AT LEFT: View of hopper below three-deck scalping screen. There are two vibrators on long sloping bottom of hopper to facilitate throughs to pass below. Hopper is mounted in rubber. AT RIGHT: Elevator on right and belt conveyor above, splitting stone over two screens



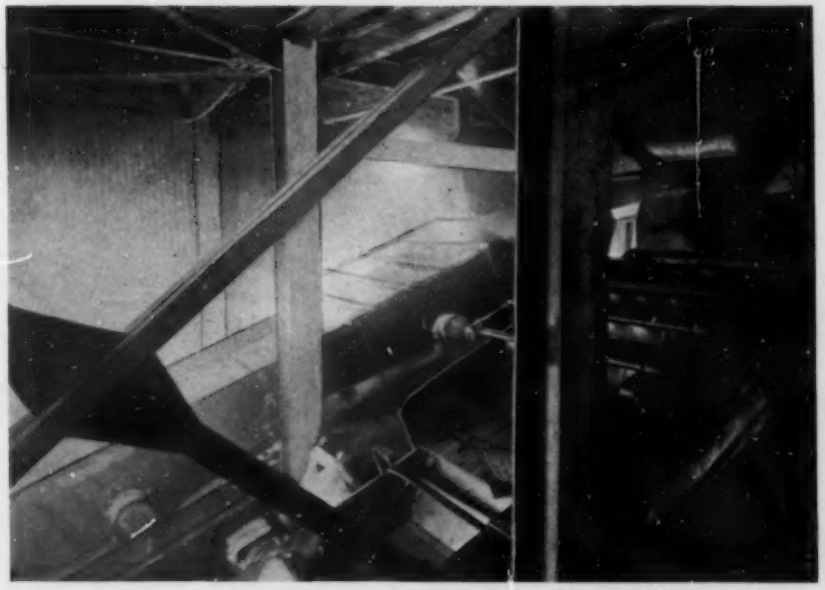
Flow sheet showing how Ohio Hydrate and Supply Co., produces and stores a large number of stone sizes for diversified demands

Vibrator Prevents Clogging

The throughs (minus 7/8-in. stone) from the 5-x10-ft. scalping screen are split and passed through a double split hopper to two Tyler "400" single-deck vibrating screens with 1/8-in. "Tyrod" screen cloth. This is the one place in the plant where there is danger in clogging the flow of material; the chute pitches throughout the plant being calculated to handle the various sizes of stone.

When the quarry is wet, the fines are inclined to stick. Two V-73 Syntron vibrators have been installed on the under side of each long sloping hopper bottom, the location being calculated for installation just off the center of gravity to create vibrations to every corner of the hopper. The entire hopper vibrates, being mounted on eight Goodrich rubber vibro-insulators. These live mountings augment, rather than dampen, the amplitude of vibration in a plane perpendicular to the sloping hopper bottom, to reach all corners of the hopper, tending to give a movement to each particle similar to that of a ball rolling down a stairway.

The minus 1/8-in. stone (dry) goes to a 150-ton bin from which it may be carried by belt conveyor either to the drying plant or for shipping. The 1/8- to 7/8-in. stone is elevated by the bucket elevator, 50-ft. centers, to the top of the plant for wet sizing from hereon. If wished, 5/8-, 7/8- and 3/8- and 5/8-in. stone can be dry-screened here but all smaller sizes are wet-screened. The bucket elevator has a carrying capacity of 300 tons per hour. The elevator discharges to a 30-in. Chain Belt conveyor on 16-ft. centers, discharging to a hopper. Here the load is split to either of two 5-x14-ft. Tyler-Niagara screens. Any part or all of the stone may be passed over either of these screens. Top deck screen openings are 5/8-in., and the lower are 3/8-in.



Wet screening small stone sizes on four large screens. The 3/8- 1/8-in. stone goes to bins, and the 1/8-in. minus is flumed to the sand machines

The 5/8-x7/8-in. size from one screen goes to the Greenville crusher, and from the other goes to a Pioneer 18-x30-in. double roll crusher, the product from both crushers passing to the boot of the elevator. This size can go directly to bins if desired. The rock passes to the crushers through baffled chutes. The 3/8- 5/8-in. size goes to bins or the roll crushers, or may be mixed with the 3/8- to 7/8-in. stone and go to bins.

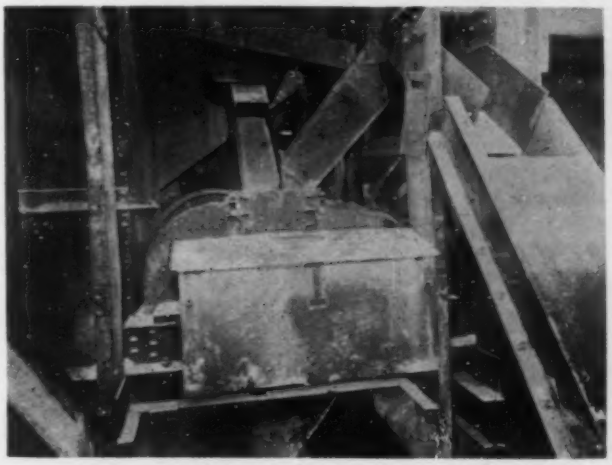
Roll crushers provide an economical means of crushing stone and are coming into more frequent use by stone plants, but as mentioned above, two crusher sizes are required to secure the stone sizes desired due to the limitations imposed by the pinch angle of crusher rolls.

The 3/8- to 1/8-in. size, with some sand in it, goes to four screens, so arranged that any of the four screens may be run with either one or both of the Niagara screens. All have 1/8-in. cloth. There are two 4-x16-ft. Simplicity screens, one 4-x12-ft. Niagara screen, and an Allis-Chalmers 5-x14-ft. low-head vibrating screen. The 3/8- to 1/8-in. stone goes to bins, the 1/8-in. minus being flumed to the sand machines. Overflow from these machines goes to two consecutive settling basins, where silt is settled out and recovered. The clarified water is re-used.

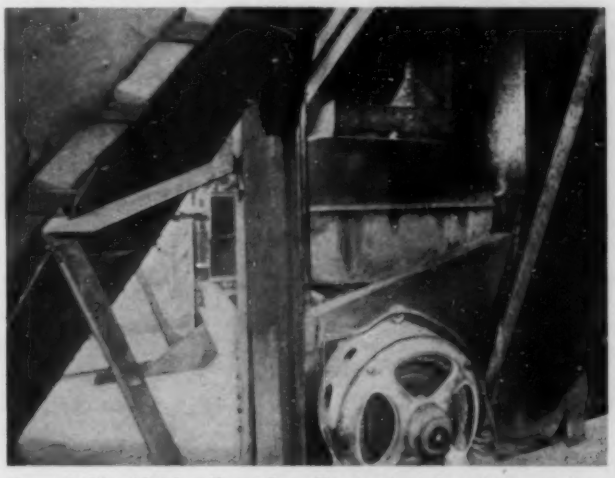
The plant has a capacity of 200 tons of sized crushed stone per hour and has ten storage bins, totalling 1400 tons. Shipping is done either by truck or rail.

Other Improvements Planned

Other divisions of the plant apart from the stone plant are also under-



Roll crusher (24- x 30-in.) for reduction of 5/8- x 7/8-in. stone. The number of chutes indicate flexibility of sizing plant



Second (18- x 30-in.) roll crusher. The product from both crushers passes to the boot of the elevator on right

Thirty-ton gasoline locomotive used for switching and hauling railroad cars in the plant yard

going improvements. The tonnage of ground lime for the glass trade has been doubled by the installation of additional elevating and screening equipment. With these improvements, the screening capacity can now handle the grinding capacity of 12 tons an hour.

A new 30-ton Plymouth gasoline locomotive has been placed into operation for switching and hauling of railroad cars in the plant yard. A small Marion ¾-yd. high speed shovel has been added for loading from stockpile and general utility work around the plant. The capacity of the Shaefer hydrator has been increased from 10 to 13 tons an hour by installation of an Eberhart super mixer for mixing the lime thoroughly before it enters the hydrator, and to recover heat from the hydrator to preheat the mixing water. The capacity for dried stone has been trebled by installation of an 84-in. by 35-ft. Bartlett-Snow counter-current, direct-heat dryer fired by stoker, coal-handling equipment and bunkers.

Monolithic Concrete House

with Welded Steel Frame

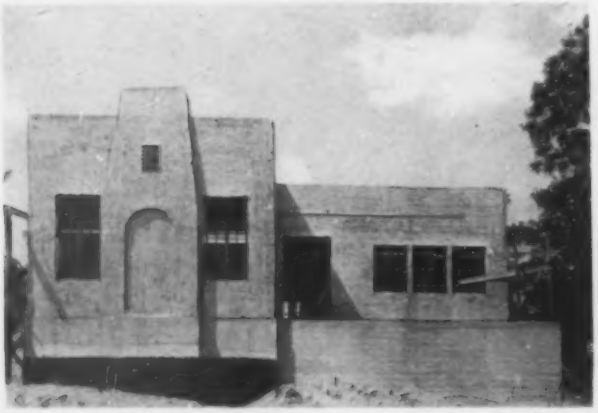
IN THE ILLUSTRATIONS are shown construction views of a new type of monolithic concrete house which is of interest to the producer of cement, aggregates, and other industrial minerals for the increasing market which these new structures offer to the industry.

This is said to be the first reinforced hollow concrete house, built without the use of forms and supported by a welded steel frame much like a skyscraper's skeleton. It is now being completed in Long Beach, a suburb of Michigan City, Ind. The house is of Spanish design with the walls having the appearance of plastic concrete over masonry. Although the house shown in the illustration had the concrete applied by hand, the use of "gunite" equipment for the application of the concrete by air pressure would cut the cost appreciably and produce a superior result.

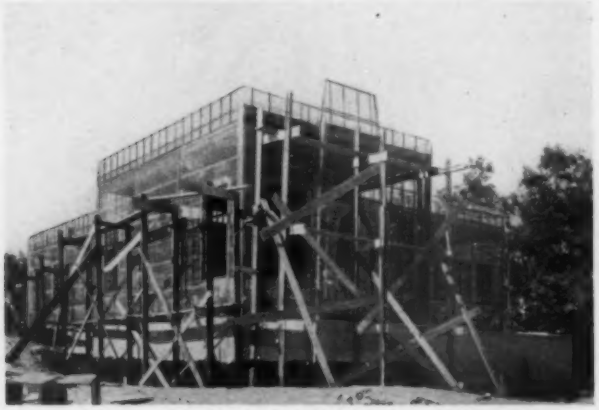
Supporting steel columns of the new house are 4-in. H sections, weighing only 10 lb. per linear foot, and the beams are 6-in., 8-in., 10-in., and 12-in. wide flange sections, weighing from 8½ to 19 lb. per foot. The entire steel frame weighs only six tons, although the house is 60 ft. long and 40 ft. wide. Steel sections were shop fabricated and electrically welded together as erected. The outer walls have a wide lattice-like frame of ¾-in. steel channels, such as used by lathers as supports for metal lathing. The vertical channels or studs are 16 in. apart, with alternate channels doubled for additional strength. The lower ends are attached to the concrete foundation and the upper ends wired to the roof girders. Horizontal channels, spaced 36 in. apart, add stiffness to walls. This lattice of light steel channels is covered with expanded flatmetal lath, cut from galvanized sheets of steel.

Three coats of Portland cement stucco were applied to the outside of the house, and the inner surface of the metal lath was heavily "back plastered" with cement stucco, imbedding the steel channels and metal lath in a concrete slab 2 in. thick and heavily ribbed at each of the channels. The steel columns and the wall girders also are encased in metal lath and concrete.

The floor and the flat roof are supported by 10-in. open-truss steel joints, covered with ribbed metal lath. The floor slab is 2½ in. of concrete, and the finished surface will be parquet flooring laid in a mastic. The roof slab is 3 in. thick, and is made with cement and vermiculite (40 percent mica) aggregate to provide lightness and insulating value. Insulation is applied to the "back plastering" and to the roof slab.



First house of concrete construction, using a welded steel frame reinforcement. View shows building with scratch coat applied



Steel frame and metal lath in place ready to receive concrete stucco, three coats outside and one "back plastered" coat

Experiments and Results with New

Drilling and Blasting Practices

By NELSON SEVERINGHAUS*

ABOUT EIGHT YEARS AGO the Rock Chapel plant of Consolidated Quarries Corp., located three miles northeast of Lithonia, Ga., was opened for the production of crushed stone aggregate. Drilling and blasting practice here has undergone a number of experiments and changes since the start.

The rock worked is a bare dome of granite-gneiss about 3000 ft. in diameter and rising 150 ft. above the surrounding ground. It is very uniform in composition and quality, without seams, and extends downward to unknown depth below the quarry floor. A water well drilled 600 ft. remained in the same rock. The principal difficulty encountered in blasting is an easy split which tends to break the rock down in large blocks.

Primary Drilling Practice

First work was with tripod mounted air hammers drilling 20-ft. vertical holes spaced about 8 ft. x 10 ft. All rock was removed by this method until the face reached about 60 ft. high. At this height, breaking was done in three 20 by 20 ft. benches, each bench having two rows of holes spaced 8 ft. apart. These were loaded with 60 percent quarry gelatin dynamite, and exploded with instantaneous No. 6 electric blasting caps. Some toe holes were used to help the bottom bench maintain a level floor. Four Ingersoll-Rand X-71 tripod mounted drifters on this work produced an average of 135 tons of rock per hour. About six Jackhammer drills were kept busy on secondary drilling for breaking up blocks on the floor.

Because of the hazards of such work, the high cost of clearing off benches for drilling, and the relatively small amount of rock that could be broken down at one time, a traction mounted, electrically powered blast hole drill for 6-in. holes was then put to work on top of the 60-ft. face. This drill averages about 2.5 ft. of hole or 100 tons of rock drilled per hour, including moving and bit changing time. As the crushing plant is now taking about 200 tons per hour of operating time on a single shift basis, the drill is run two shifts to keep drilling ahead. Two men on each shift

Nelson Severinghaus

operate the drill and hand sharpen the 6-in. chisel bits with a coke forge for heating. A 6-in. ring of Jackhamer holes about 2 ft. deep is drilled before starting each hole to aid in collaring. A series of elevation bench marks is occasionally established back from the rim and drillers use a hand level to determine hole depth from these.

Holes are drilled 5 ft. below the quarry floor so that shovels can maintain a level floor on broken stone. As soon as a hole is drilled, it is covered with a slab of rock sealed around the edges with concrete and the depth marked on the concrete. This effectively excludes loose material from washing in and filling up part of the hole. When loading time comes, such caps are readily knocked off. An air displacement cylinder with bottom check valve is lowered into each hole to remove water just before loading. This device clears out the water much faster and with less labor than previously required with a hand bailer.

The spacing, burden and depth of each hole are checked before loading and the tons which will be moved by each figured. This, divided by a loading factor decided upon, gives the amount of dynamite to be placed in each.

Primary Blasting Practice

Placing of holes for the first shot in June, 1930, followed the usual practice for this height face with average spacing of 17 ft. and burden of 21 ft. The 24 holes of the first shot were loaded with 4000 lb. of 75 percent quarry gelatin in the bottoms and 7100 lb. of 60 percent quarry gelatin above. A considerable amount of screenings stemming was used to maintain the four tons to a pound ratio decided upon and yet raise part of the load up toward the top of holes. Detonation was by Cordeau fuse in each hole, connected to a Cordeau trunk line on top, with an electric cap on one end. Fragmentation was poor, and an excessive amount (about twice that previously required for tripod drilled rock) of secondary blasting was necessary to prepare the stone for shovels. This indicated a reduction of burden and spacing. As the next shot was already largely drilled, spacing was left the same but the burden was reduced by taking off a slab with tripod drills so that it averaged but 15 ft. The loading basis was changed from four to 3.5 tons of rock to the pound of dynamite. The dynamite used was about one-half 75 percent and one-half 60 percent quarry gelatins. Results were much better than those of the first shot and breakage was comparable with that of tripod drill shooting.

On the next several shots, we attempted to get good breakage by using a lower loading factor of about 3.3 tons per pound with 18 ft. spacing and 20 ft. burden to keep from running drilling

*Superintendent, Consolidated Quarries Corporation, Lithonia, Georgia. Presented before the recent meeting of Industrial Mineral Division, A.I.M.E.

costs per ton too high. This gave solid column loading with no stemming, and was about the maximum load which could be used without throwing rock beyond the quarry floor. In shot No. 4, semi-gelatin ammonia dynamite was substituted for 60 percent quarry gelatin with some saving in cost and no appreciable change in effect. Fragmentation remained none too satisfactory.

With the idea that a higher velocity explosive might aid fragmentation, shot

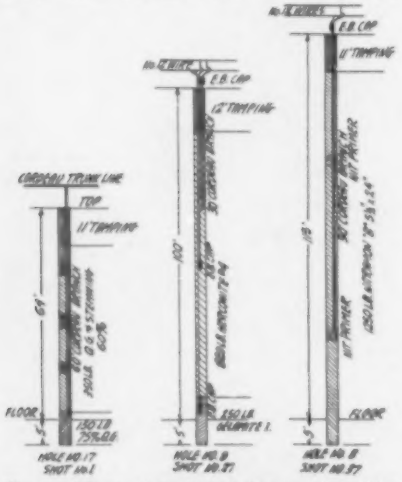


Fig. 1: Chart of typical holes in shots Nos. 1, 27, and 38, illustrates methods used to initiate detonation

No. 5 was made largely with 60 percent straight nitroglycerine dynamite. Breakage appeared to be some improved.

Experiments with the next three shots indicated that a wider spacing of 24 ft. and lowered burden of 17 ft. gave good fragmentation even when using less costly and less dangerous semi-

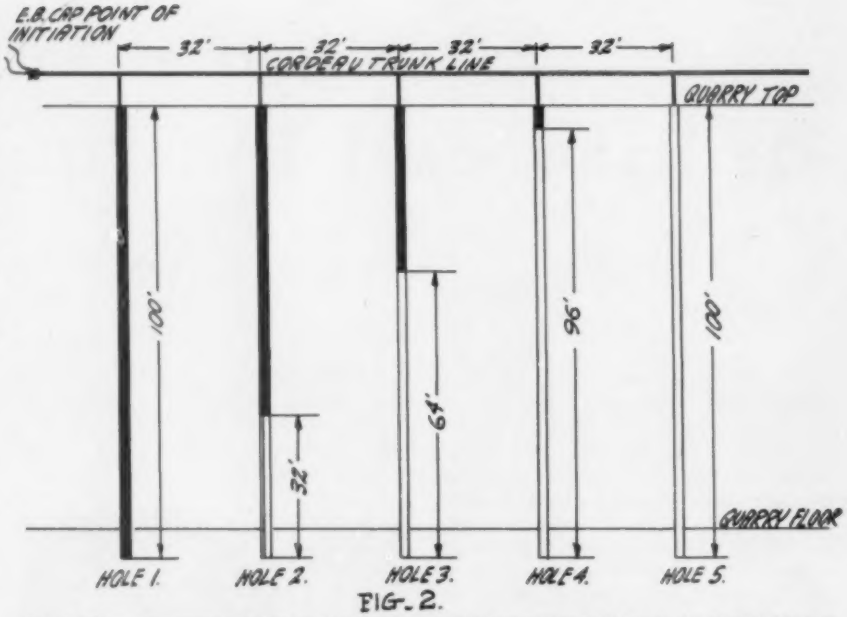


FIG. 2.

Fig. 2: Chart represents conditions of a Cordeau trunk line connected shot at the time detonation wave has reached the bottom of the first hole. Darkened hole areas represent depths already detonated

gelatin and ammonia dynamites of slower speed. For some time, spacing was kept at this figure and increasing percentages of bulky ammonia dynamite used until the loading ran about one-fourth of 60 percent semi-gelatin and three-fourths of 45 percent bulk strength ammonia dynamites. Then spacing and burden were again experimented with until we reached the present standard of 32- by 16-ft. Wider spacing than 32 ft. makes it impossible to break all of the toe out clean; decreased spacing gives poorer fragmentation. Further decrease in burden does not seem to help breakage while increase hinders it.

On shot No. 17 we tried detonating the charge by an instantaneous electric blasting cap placed near the bottom of each hole instead of by Cordeau trunk line as previously used. This gave better breakage and distribution of rock on the quarry floor than any previous shot.

Failure of five holes in shot No. 19 which was connected the same way taught us to use ample size, well insulated wire. Use of long leg wire (125 foot No. 18 duplex enamel wire) caps improved convenience and safety. On the next shot we did away with the Cordeau trunk line which had been used along with caps as a safety measure. Tests on the ground indicated that the fifth hole would cut the Cordeau trunk line before its wave of detonation had reached this point and thus it could not be counted on to carry out the shot in case of cap failure further on.

The next step in detonating methods was the use of two, and then three electric blasting caps in hole. This further improved breakage. "Pot Holes" of highly fractured rock about half way between cap locations, appeared regularly in the face after such shots and indicated an increased effect of explosives at points where detonation waves met.

Fig. 3—SHOT NO. 1—Consolidated Quarries Corp., Rock Chapel Plant, June 11, 1930

Hole	Depth	Burden Space	Burden Top	Burden Bottom	Burden Tons	Tons 4	Total Expl.	75% Q.G.	60% Q.G.	Tamping
1	56	19	10	16	1030	257	250	100	150	10
2	58	18	19	28	1820	455	450	200	250	11
3	61	19	20	27	2010	503	500	200	300	10
4	63	18	20	26	1990	498	500	250	250	13
5	62	18	21	24	1960	490	500	200	300	12
6	63	18	20	26	1980	495	500	200	300	11
7	64	18	20	26	2040	510	500	250	250	12
8	65	18	20	24	1980	495	500	150	350	12
9	66	18	20	24	2020	505	500	200	300	11
10	66	18	19	22	1840	460	450	100	350	11
11	69	19	20	25	2170	543	550	150	400	10
12	65	16	21	26	1850	463	475	200	275	13
13	69	16	23	26	2040	510	500	200	300	12
14	69	16	23	25	1940	485	500	150	350	11
15	65	16	22	26	1840	460	450	200	250	12
16	69	16	23	25	1990	498	500	200	300	12
17	69	16	22	25	1980	495	500	150	350	11
18	69	16	22	24	1970	493	500	150	350	11
19	67	16	22	24	1860	465	475	100	375	10
20	66	16	22	24	1880	470	475	150	325	11
21	65	16	22	24	1670	418	425	150	275	11
22	66	16	22	24	1730	433	450	200	250	10
23	65	13	22	24	1810	453	450	150	300	10
24	65	Cut-off	14	16	1125	281	200	—	200	10
		390			44525		11100	4000	7100	

Note: All holes 6 in. Diameter. Type Stone—Granite. Weight Stone—164 Lb. Cu. Ft. All holes drilled 5 ft. below quarry floor. Tonnage shown only available stone or that which would be recovered. Loading basis: 4.0 tons to pound of dynamite. Percentage of strengths used: 75 percent Q.G.—36 percent, 60 percent Q.G.—64 percent.

Results: 1. Poor fragmentation. 2. Toe pulled clean. 3. No damage done. 4. Clean Quarry face, very little back break.

Next Shot: Use 50 percent of 75 percent Q.G. Reduce burden. Increase loading basis to 3.8.

Present Explosive Methods

This method of shot initiation was followed until the advent of Nitramon, the new safety agent for quarry blast-

Fig. 4—SHOT NO. 27—Consolidated Quarries Corp., Rock Chapel Plant, January 10, 1936

Hole	Depth	Space	Burden	Tons	Tons 3.5	Total Expl.	Gel	Herc	Cars		Tamping
1	92	29	14	3060	875	870	270	600	85	48	16
2	97	29	16	3700	1060	850	280	570	95	45	12
3	100	29	16	3800	1090	900	250	650	90	49	14
4	105	30	15	3880	1110	1060	250	830	100	55	14
5	107	32	15	4220	1200	1050	250	800	100	50	12
6	107	32	16	4480	1280	1120	250	870	100	58	12
7	107	32	12	3360	960	720	250	470	100	..	14
8	105	33	15	4270	1220	1070	250	820	95	55	12
9	100	33	13	3520	1000	1000	250	750	90	58	12
10	112	31	15	4270	1220	1160	250	910	95	54	14
11	112	32	15	4400	1260	1000	150	910	99	54	13
12	112	32	15	4400	1260	1070	...	1070	103	57	14
13	110	32	15	4330	1240	1050	...	1050	95	50	13
14	112	31	16	4550	1300	1000	...	1000	97	54	15
15	112	30	14	3860	1100	1050	...	1050	98	51	12
Tot.	1590	467	222	60100	17175	15050	2700	12350			
Avg.	106	31	14.7	4006	1145	1003					

Notes: Net recoverable tonnage 57,000. All caps in parallel on No. 12 W.P. Wire. Cordeau in each hole but no trunk line.
Results: Good breakage and distribution. Toe pulled out clean. No damage done. Top left in good shape—little back break.

ing with deep well drill holes. To fully utilize the safety features of this agent, it was necessary to eliminate the use of caps in holes. The fact that Cordeau is faster than Nitramon and will not initiate detonation of Nitramon without a special primer were suggested by Mr. R. C. Crumbaugh of the duPont Co. as making possible the combination of the advantages of multiple initiation points within the hole and the safety of the Cordeau-Nitramon method of shooting. This was tried very successfully in the last two shots. Chart of typical holes in shots Nos. 1, 27 and 38 is shown in Fig. 1 to illustrate the various methods which have been used to initiate detonation. With Nitramon, we are using an instantaneous electric blasting cap on the Cordeau, leading down into each hole, instead of a Cordeau trunk line as I believe the instantaneous initiation of all holes gives better results. Although the time interval from one end of a shot to the other is small with Cordeau (speed about 17,500 ft. per sec.), I believe it is significant in this rock. Fig. 2 illustrates my theory for this difference which results seem to justify. This illustration is drawn to represent conditions of a Cordeau trunk line connected shot at the time the detonation wave has reached the bottom of the first hole. Darkened hole areas represent depths already detonated. As the holes are 32 ft. apart, detonation at this instant will be 32 ft. from the bottom of hole No. 2, 64 ft. from the bottom of hole No. 3, just starting in No. 4 and will not yet have reached No. 5. Thus the effect is that of a wedge being driven in from the upper left hand corner. In a rock as easily split as that of Rock Chapel, this perhaps allows the expenditure of some of the explosive energy in most holes, out in a crack already started, instead of in breakage of solid rock in front of it. Frequent excellent breakage at the end of shots here tends to confirm this theory.

Typical Loading Charts

Loading charts of Shots Nos. 1, 27 and 38 are given in Figs. 3, 4 and 5 to show details of the major changes in drilling and blasting above described.

For secondary drilling of blocks on the quarry floor, we now run six to eight light weight, hand held air hammers. On about 80 percent of the blocks holes 2 ft. deep or less are needed and they are drilled with 40 lb. hammers, using 1¼-in. cross bits on ⅞-in. hollow hexagon steel. The particular drills used for this have been found to drill about 20 per cent faster without shank collars, so none are used. Where deeper holes are needed, 1-in. steel and heavier hammers (50 lb.) are used. Starting bits are 1⅞-in. in diameter with ⅛-in. change for each 2 ft. depth.

Most of the dynamite used for this breaking is semi-gelatin packed in 1-in. x 4-in. cartridges. On deeper holes, 1¼-in. x 8-in. of the same grade is used. All holes are primed with 4 ft. iron wire electric blasting caps and tamped with stone screenings. About 30 caps are connected in series with No. 30 annunciator wire and such groups paralleled on the end of No. 18 duplex all-rubber cable. Final connections are made at the end of the working shift and firing is done from a 550-volt power line at a point in a crusher building overlooking the whole quarry. Failures with these methods are extremely rare although as high as 300 blocks have been shot at one time. Time saving and greater safety justify the higher cost of electric caps compared with fuse and cap shooting.

Conclusions

Conclusions reached from our experience discussed above are:

(1) Although conventional hole spacing is a good guide in starting out with any new quarry, experiments may show an unconventional spacing to give much better results in some rocks. Thirty-two foot spacing and 16-ft. burden gives best results at Rock Chapel.

(2) Spacing is much more important in securing good fragmentation in some quarries than type and grade of explosive used. No explosive has yet given good fragmentation here when burden exceeds spacing.

(3) Instantaneous detonation of all holes gives better breakage than is secured with Cordeau trunk line detonation.

(4) Several separated points of detonation within a hole help fragmentation.

(5) The safety of Cordeau can be combined with instantaneous firing of all holes by using electric blasting caps on top of Cordeau in each hole. This keeps all caps off the job until all loading is completed.

(6) Separated points of detonation within each hole are secured by using Cordeau with the new blasting agent Nitramon and separated primers.

Fig. 5—SHOT No. 37, Consolidated Quarries Corp., Rock Chapel Plant, August 6, 1937

Hole	Depth	Space	Burden	Tons	Calc Cans	Actual Load Nit B	Nit C	Primers	Total		Primers	Stemming
1	116	32	16	4870	52	*	*	*	*			
2	118	32	15	4640	52	48	2	2	52	45	95	11
3	118	32	15	4640	53	48	2	2	52	44	88	11
4	120	32	16	5030	54	48	2	2	52	40	90	11
5	120	32	15	4720	54	50	2	2	54	38	90	10
6	120	32	16	5030	54	49	2	2	53	40	90	11
7	117	32	15	4900	53	48	2	2	52	38	82	12
8	120	32	15	4720	54	50	2	2	54	38	90	11
9	117	32	16	4910	53	48	2	2	52	33	87	11
10	117	32	15	4600	53	47	2	2	51	42	86	11
11	115	32	15	4530	51	47	2	2	51	31	79	13
12	110	32	16	4620	49	44	2	2	48	40	84	10
13	112	32	16	4700	50	41	3	3	47	36	80	18
14	110	31	17	4750	49	46	2	2	50	44	82	12
15	100	32	17	4460	45	38	2	2	42	36	80	12
16	95	32	16	3990	42	37	2	2	41	31	71	13
Tot.	1825	511	251	75110	819	689	31	31	751			
Avg.	115	32	16	4694								

Notes: Holes No. 1 could not be loaded because of offset from previous shot. At each hole an E.B. Cap was placed on branch line of cordeau using special unions. All caps connected in parallel to No. 12 R.C. wire.
Results: Excellent fragmentation. Toe pulled clean. Little back break. No damage.
Summary: 689 Cans Nitramon B @ 25 lb.....17,225 lb. (5½x24)
31 Cans Nitramon C @ 22.22 lb..... 690 lb. (5½x24)
31 Primers @ 22 lb..... 682 lb. (5x24)
TOTAL.....18,597 lb.
Total rock—15 holes 70,240 Tons. Loading factor 3.77 tons to pound.

Eliminate Complicated System of Coal Handling by

DIRECT-FIRED MILL INSTALLATION

By J. C. BENNETT

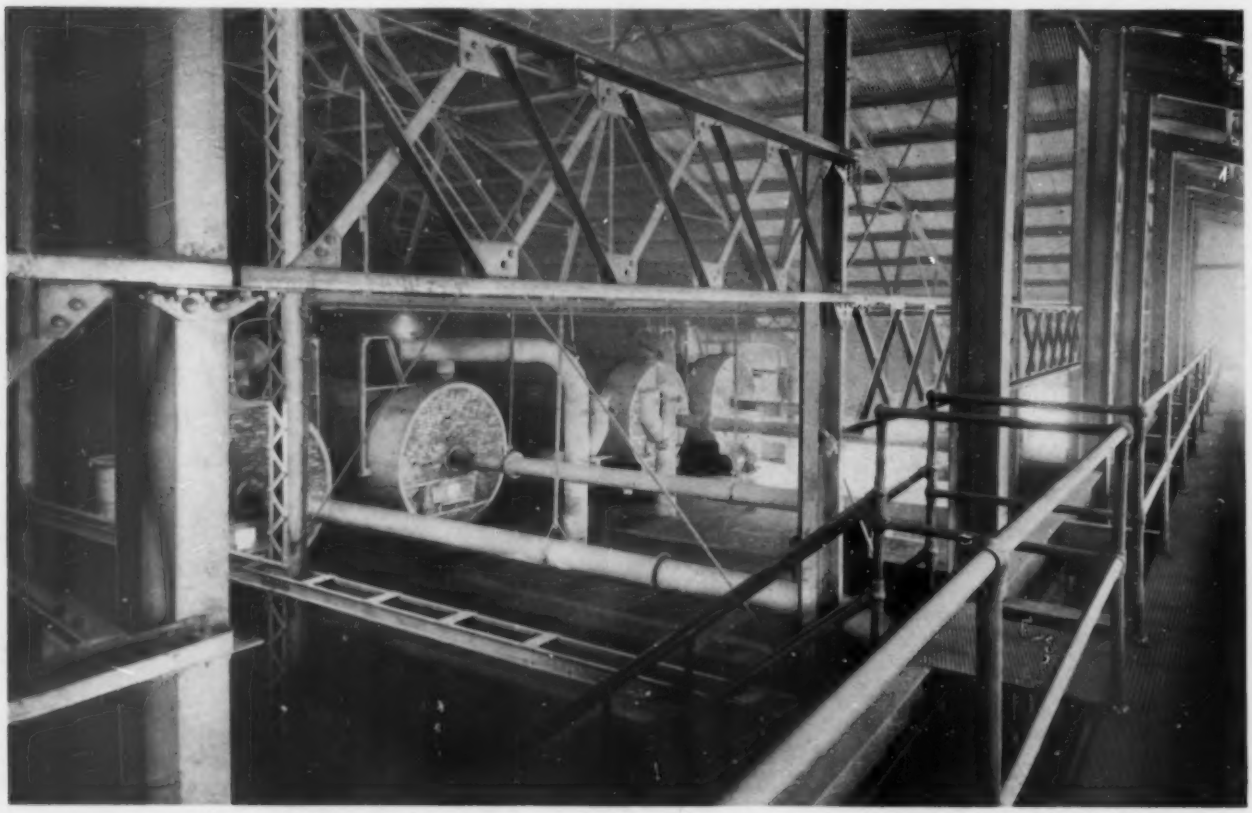
Asst. Supt., Hawkeye Portland Cement Co.

WITHOUT INTERRUPTION IN CEMENT DELIVERIES and with little curtailment in the burning and grinding of cement clinker, the Hawkeye Portland Cement Co., Des Moines, Iowa, has completed a most modern addition to its firing floor and is now firing kilns with Babcock and Wilcox direct-fired coal mills.

The new installation of coal handling and firing equipment replaces a rather complicated system of feeding the coal into the kilns; it has reduced the connected load in electrical horsepower by 135 hp., and has saved at least 15 percent in the coal as received. The saving in fuel resulted from the elimination of dryer stacks, vent pipes from grinding equipment, etc.

Coal was handled and re-handled so many times before the new installations were introduced, that it was impossible to do a good job of "Housekeeping." Much of the finer product was literally blown away, and spontaneous combustion was always a hazard. Coal from cars or trucks was handled by crane to a single-roll crusher, and carried over a belt conveyor to storage. From storage, a second belt conveyor handled the coal to a hammer mill after which it was elevated to the dryer tanks. From the dryer tanks, coal was removed by screw conveyors and fed to four dryers by table feeders. After drying, screw conveyors and elevators made the transfer to the mill bins, and then elevators and screw conveyors again were needed to place the coal in the kiln tanks. This system was quite complicated and certainly very inefficient as compared with the new method.

Construction of the kiln building addition started on March 15, 1937, the first coal mills reached the plant on April 29, and full operation with the six new mills began on August 8.



Firing floor of Hawkeye Portland Cement Co. after six new coal mills were installed. Note that ample space is provided on the firing floor, making working conditions as comfortable as possible for the men

Coal mill feed bins with coal level indicators and one of the U-shaped instrument panel boards controlling two kilns. Bins are suspended to conserve floor space on coal mill floor

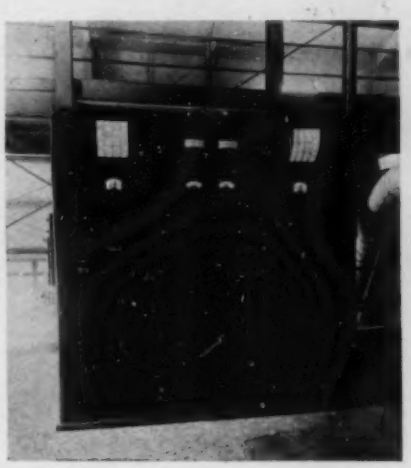
Generally, a construction program of such magnitude is undertaken by most cement companies during the winter seasonal shutdown period when the stockhouses are filled and the demands for cement are not heavy. At this plant, however, construction was so planned that any of the kilns could be operated up to the time when the last coal mill was being placed.

Direct Firing Installation

To carry out this plan, an addition to the kiln building was constructed, and the six Babcock and Wilcox type B No. 132 coal mills (driven by 100-hp. motors) were installed in the new structure on a floor below the firing floor, the mills being placed on both sides of the rotary clinker coolers as each cooler handles clinker from two kilns. These coolers were formerly operated outside the building. While these units were being installed, the old equipment and the coal bins on the kiln floor above remained in place in the event orders would require operation of the kilns. The building housing the coal drying machinery is being demolished.

Coal from cars or trucks is handled to a Jeffrey 30-x30-in. roll crusher. Storage for 1500 tons of coal is provided at the crane. The crushed coal from the roll crusher is carried by a 30-in. belt conveyor, extended to 339-ft. centers, to a new 20-x26-ft. crushing building followed by a short conveyor, the head pulley of which is a Dings magnetic pulley.

The conveyor discharges to a Tyler 4-x5-ft. single-deck screen with ¾-in. square openings. Plus ¾-in. coal passes to a 12-ton surge bin from which it is fed to a Williams No. 3 hammer mill by a 24-in. pan feeder. The discharge from the mill and the minus ¾-in. coal from the screen are carried to the top of the new coal mill feed bins by a 12-in. screw conveyor and a bucket elevator, 46-ft. centers. The discharge from the bucket elevator is carried to the six mill feed bins by a 12-in. Link-Belt screw conveyor 193 ft. long. An intermediate steel storage bin of 200-ton capacity is being completed between the crushing plant and the coal mill feed bins for a reserve supply of minus ¾-in. coal ready for the mills. The same bucket elevator, raises this coal to the screw conveyor filling the mill bins.

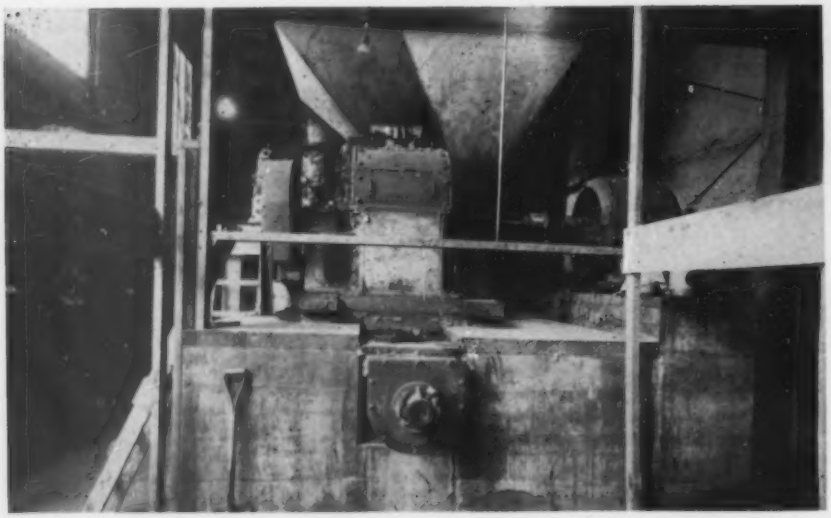


Front view of U-shaped instrument panel board

Minus ¾-in. coal is fed to the six new inverted steel conical bins, each feeding a coal pulverizer. The bins are suspended from the I-beams above, and have no supports on the floor below. They were fabricated to order by the Des Moines Steel Co., Des Moines, Iowa.

Each bin is equipped with two Bindicators to automatically indicate the coal level in the bins. Each bin contains enough coal for an hour's run of the kiln when the bottom indicating light goes out.

Firing floor layout is such that temperatures are not excessive even during hot weather, and conditions are very "livable" for the working man. The only equipment on the firing floor are the kiln pipe connections and the panel control boards for kiln operation. The distance from the center of each coal mill to the kiln hood is 45 ft.



Hammer mill for crushing plus ¾-in. coal. A screw conveyor and bucket elevator carries the crushed coal to the mill feed bins

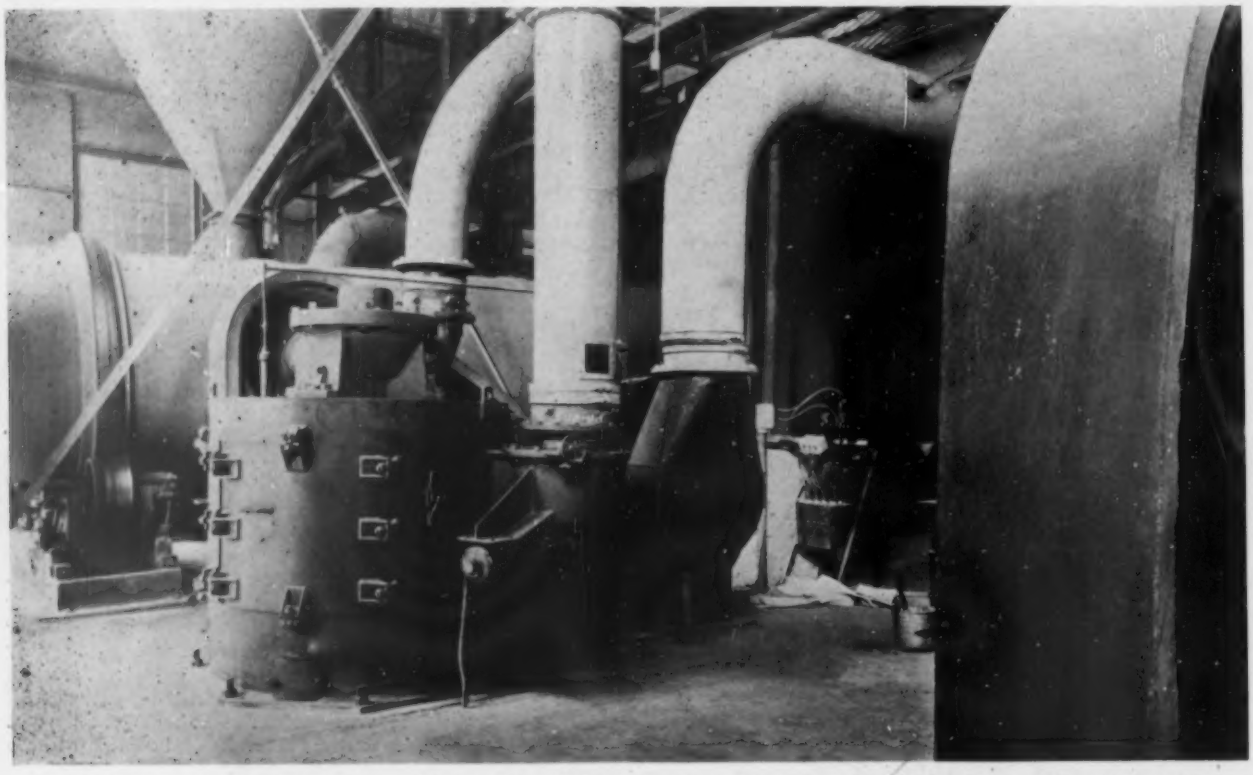
Dry Coal With Air From Kiln Hood

Air for drying the coal in the mills is taken from the top of each kiln hood and is tempered by cool air for differences in moisture and for the type of coal being burned. The flow of coal from the feed bin to each mill is clocked by a Bailey coal meter above the mills. Various coals are burned, all of which are high in volatile matter and high in ash content. It is only necessary to pulverize coal to about 80 percent through the 200-mesh sieve. The temperature of the mixture of coal and air is varied between 100 deg. F. and 150 deg. F., dependent on atmospheric conditions and the coal being burned.

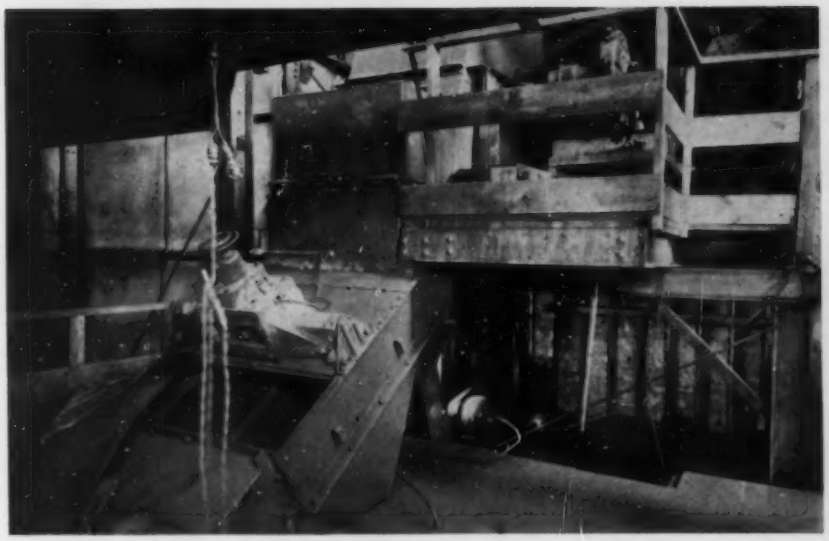
Six 8- x 125-ft. kilns are grouped in pairs, and a U-shaped panel board is provided for each group of two kilns. The kiln controls for stopping and starting the kilns and for speed regulation are transposed so that the controls for kiln No. 2 are placed on the side panel of the U-shaped board opposite kiln No. 1 and vice versa. In this way, the operator can see the full length of the kiln as he operates the controls.

On the front panel are indicators and controls for the coal pulverizing units including: indicators for air temperature entering the fan, for the mixture of air and coal and for differential pressures needed for operation of the coal feeders, and the push starting switches for the pulverizer and the coal feeder. Other instruments on the front panel are the indicating pyrometers, the ammeters for kiln motors and electric revolution counters. Ammeters and push button controls are manufactured by the General Electric Co., the coal feeder switch is manufactured by Cutler-Hammer and all other instruments are made by the Bailey Meter Co.

The plant is a waste heat plant generating its own electric power. In addition to the 135-hp. saved in connected motors with the new installation, there is a saving in electricity, or rather a recovery of electricity, since direct current need not be generated to drive the new equipment. This former method was always an inefficient operation requiring 1070-hp. of alternating current power for conversion to the required 800 hp. of direct current power. Now 665 hp. is



Direct-fired coal mill installed between clinker coolers. Air for drying the coal in the mills is taken from the top of each kiln hood



Single deck screen for sizing the coal for the feed to the mills

needed to drive the coal plant, or an actual saving of 405 hp. is realized. While the new mills have only been in operation a short time, the above power saving has taken place, and a 15 percent coal saving per barrel of cement has been achieved due to the efficiency of the new over the old system of coal handling. Helmuth Krarup is superintendent of the plant.

REPUBLIC PORTLAND CEMENT CO., San Antonio, Texas, has announced that the stockholders have authorized a change in name to Longhorn Portland Cement Co.

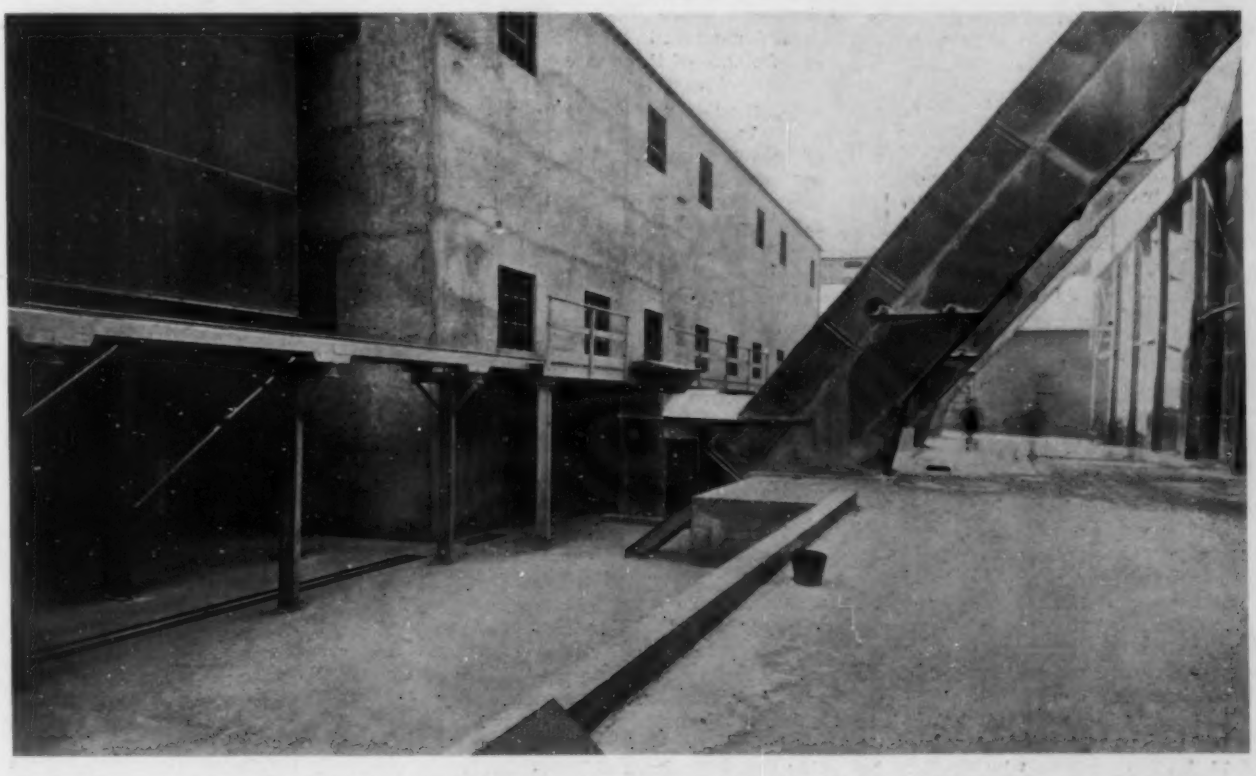
DEWEY PORTLAND CEMENT CO., Buffalo, Iowa, has resumed operations after a short shut-down occasioned by differences between labor groups.

Court Upholds Florida Levy

VALIDITY OF THE FLORIDA LAW passed at the last session of the legislature, imposing a $3 per ton inspection fee on imported foreign cement, was upheld by the Florida Supreme Court on October 12. It had been argued that the measure was unconstitutional because it sought to levy a "tariff" on foreign goods, but the court held the fee required to be paid was an inspection fee to meet expense incurred by the State in the enforcement of the inspection law. When the state road department refused to enforce the law, the Florida Portland Cement Co., brought mandamus proceedings to compel operation under its terms. About 30 percent of the cement used in Florida construction is imported.

Complete Cement Plant Nov. 1

GULF PORTLAND CEMENT CO., announces through President Kent B. Diehl that its new cement plant at Houston, Texas., is scheduled to start operations about November 1. The plant facilities comprise a main mill building, an 8-ft.x220-ft. kiln, a 6-ft.x120-ft. cooler, and four storage silos with a total capacity of 25,000 bbl. Expenditures for the new plant amount to $300,000.



New addition to the kiln building in which the six direct-fired coal mills were installed. To the left is shown the reserve coal storage bin, and to the right is the elevator to carry clinker to storage

Mining Engineers Devote More Attention To

INDUSTRIAL MINERALS

By NATHAN C. ROCKWOOD

It was an honor and privilege to attend on October 15, the dedication of the new United States Bureau of Mines Eastern Experiment Station on the campus of the University of Maryland, College Park, Md. This new station is especially designed and equipped to study and make research into the problems involving industrial minerals—or rock products.

In connection with the dedication, the Industrial Minerals Division of the American Institute of Mining Engineers held a two-day meeting at Washington and College Park, devoted to a discussion of practice and research in the industrial minerals field. Chester A. Fulton, chairman of the division, a Florida pebble phosphate producer, presided.

Drilling and Blasting

A very interesting and suggestive paper was that by Nelson Severinghaus, superintendent, Consolidated Quarries Corp., Lithonia, Ga., on his drilling and blasting practice, which is given almost in full elsewhere in this issue. The paper was suggestive of results which may be accomplished in any rock products operation by a study of details. Mr. Severinghaus is a graduate mining engineer of Columbia School of Mines, and has regarded his job as a quarry superintendent from a professional angle.

A comparative test of 6-pt. and 4-pt. hammer-drill bits was then described by H. O. DeBeck, consulting geological engineer, Burnsville, N. C. The test was made in drilling feldspar with 2-in. to 1⅝-in. holes. These tests proved that the 6-pt. bit (or rose bit) drilled 15 ft. per hr. at a cost of $0.122 per ft. against 12 ft. per hr. and $0.152 for the 4-ft. bit. The author pointed out that this difference referred only to the particular conditions and no general conclusions could be drawn from it.

The discussion brought out that hard rock miners are prejudiced against the 6-pt. bit. The reasons why the 6-pt. bit gave the best results were discussed and it was suggested that by making finer cuttings, the cuttings were more readily removed and there was less cushioning effect from them on the drill.

Limestone Mining Methods At Ste. Genevieve, Mo.

Ralph W. Smith, Peerless White Lime Co., Ste. Genevieve, Mo., a mining engineer who has taken on research and development of lime products in addition to direction of mining operations, described the evolution of mining practice in what is generally regarded as the purest deposit of high calcium limestone in the United States. The lime, limestone and precipitated calcium carbonate from this operation are shipped to practically every state in the union.

Mining methods have been developed to take care of three separate strata or layers of limestone, each of which has some special qualities, or properties or impurities which either commend it for certain uses, or prevent its use for other purposes. The total depth of the three strata is about 80 ft. and all except a safe roof and pillars to support it are removed in two or three benching operations.

The drilling and blasting are conducted to produce the least amount of spalls (minus about 4 in.) because the lime plant has no facilities for burning these spalls. This is accomplished by a study and proper selection of the (1) dynamite, (2) placing of drill holes, (3) stemming. It was found too easy to overload the holes with gelatine dynamite, and black powder could not be used because of the gases generated, so an ammonia dynamite was selected. The drilling is done with jack-hammers mounted on columns, and while all the holes are drilled and loaded at one time, they are shot separately, in rotation, from top to bottom, the rock burden from the upper holes being cleaned up before shooting the bottom holes. Moist stemming is used, consisting of 2/3 moist clay and 1/3 pulverized limestone.

Blasting is done during the work of the regular shifts, there being many headings in the mine, and special safety precautions are taken through warning whistles and red glares.

There is a layer of stone containing considerable magnesium carbonate between the two, much thicker, layers of high calcium stone, which must be handled separately.

Gasoline locomotives and 6- to 10-car trains are used to haul out the stone, which is hand-loaded. There is no artificial ventilation in the mine, the rooms being very high.

With this system of mining and handling, it has been possible to cut down the spalls to about 20 to 22 per cent. The total output of stone is about 3.6 tons per man-hour.

The mining operation and selection of stone in the mine is only the first step in the preparation of carefully controlled processing throughout the plant.

Purifying Minerals

The quite remarkable progress being made in the separation and classification of minerals hitherto difficult to separate was described at considerable length by G. W. Jarman, Minerals Separation Corporation, New York City. He described in brief (1) magnetic separation, (2) static electrical separators, (3) air flotation separators.

Nearly all the older methods of separation depended on differences in the falling rates of different minerals, or different sizes of minerals, which is the principle of present day sand classifiers in the sand and gravel industry. The medium usually employed is water or solutions or emulsions of various substances in water.

Magnetic separators and electrostatic separators work on the principle of merely deflecting the fall of various particles so that some fall one side and some the other side of a thin dividing diaphragm. The results depend on the magnetic or electric susceptibilities of various materials and on the preparation. About 150-mesh size is the finest

that can now be separated in this manner. Fire clay and glass sand can be separated from iron in this manner; and feldspar from mica, by a similar method, using electrostatic electricity instead of magnetism.

The latest development is air flotation where the minerals to be separated are allowed to flow over a table, very similar to the Wilfley concentrating table used for many years in concentrating ground ores in wet flotation. In the new process air, instead of water, is used to float the particles on the table, the air being admitted from below. Mica, fluorspar, fuller's earth, and abrasives have been classified and concentrated by this method.

Combinations of two or more of the processes described offer great possibilities. Generally, costs are higher now than can be afforded in the preparation of common rock products, but the art is very young.

Sand and Gravel

With Dr. Oliver Bowles, United States Bureau of Mines, presiding, most of the second session had to do with sand and gravel.

E. L. Spain and N. A. Rose, geologists with the Tennessee Valley Authority (TVA), described how the Cumberland river had classified gravels and sand as a natural process. Samples of gravel were taken from the river bed at many points and from many producers' stock piles. These were tested as to mineral character and as to their suitability for aggregates.

From the data collected and from a study of the geology of the country drained by the river, it was possible to chart a profile of a long stretch of the river showing where the various types of aggregates could be found.

The major constituent of the river gravel is chert. Sound chert was considered a satisfactory aggregate. Unsound chert was quite undesirable. Quartzite is the best aggregate material in the river. It is found all the way to the mouth of the river, although it originates in its upper reaches. It is abundant in the river only in the upper and middle parts. What was termed weathered chert and sandstone are the next best aggregates after sound chert. Neither, however, are considered good aggregates.

The study is of interest in showing how the character of the country through which a river flows affects the gravel deposits in the stream bed, and in showing how the attrition of the moving materials produces sand from the sandstone and silt from the cherts; where these deposits are found, and why.

The discussion concerned chiefly the merits of the freezing and thawing and sodium sulphate tests as to determinability of soundness. It was brought out by Stanton Walker, director of engineering and research, National Sand and Gravel Association, that to draw the line between sound and unsound cherts is one of the hardest problems the industry faced. Most southern river gravels are largely chert.

Sand and Gravel Specifications

In his paper on sand and gravel specifications and the reasons for them, Stanton Walker discussed unsoundness of aggregates and the various tests tried to determine soundness. With these, ROCK PRODUCTS readers are more familiar than mining engineers, for whom the paper was intended. He also told of the attempt being made by the joint committee of the three national aggregate associations to establish standard specifications for sizes of aggregates.

Mineral Wool

J. R. Thoenen, senior engineer, technologic branch, U. S. Bureau of Mines, spoke extemporaneously on the results of his recent investigation of mineral wool manufacture in the United States. His work will be published in detail by the Bureau, probably before the end of the year.

In 1929 when Mr. Thoenen made a similar investigation (published as I.C. 6142, June 1929) he located seven companies operating eight plants. Production in 1928 was about 50,000 tons. In 1937 there were 50 or more companies operating about 60 plants and their capacity was estimated at 500,000 tons per annum—undoubtedly the fastest growing rock products industry.

He sketched the history of mineral wool and its character. The materials from which it is being made are very numerous, including calcareous shales, slags from all kinds of metallurgical plants, sand, soda ash and limestone and waste glass, combinations of dolomites and limestone with shale or clay, old china or crockery, firebrick and even top soil.

Mr. Thoenen estimated that there were in operation today the equivalent of 150 cupolas, averaging 10 tons per 24 hrs. capacity each, and that the products produced were approximately one-third loose wool, one-third granulated wool, one-third fabricated wool (into blankets, bats, insulation blocks, pipe covering, etc.)

The cupolas range from 26 to 72 in. in diameter and 7 to 16 ft. high. They are water-cooled with circulating water pressures in jackets from 25 to 100 lb. per sq. in, requiring 25 to 50 gal. per min. per cupola. Melting temperatures apparently vary from 2300 to 3400 deg. F. The temperatures at which the slags are blown are considerably lower, ranging from 2000 to 2850 deg.

Air pressures for blowing the cupolas, according to Mr. Thoenen, range from 1.7 oz. to 1½ lb. per sq. in.; the amount of air required varying from 60 to 1200 cu. ft. per min.; the air required per pound of loose wool varied all the way from 6 to 86 cu. ft. The tuyeres (slag outlets) varied all the way from 4 to 24 in. above the floor.

The cupolas had each from 1 to 6 streams at a tap, and the streams of slag varied from ¼ to ¾ in. diameter, and were 3 to 15 in. long—the distance from the tap to nozzle varying somewhat with the type of wool blown.

Both steam and air are used for blowing the wool. Steam pressures varied from 45 to 125 lb. per sq. in. and air pressures 50 to 95. There was a corresponding difference in the amounts of steam or air required. There were differences in fibre diameter, the average size being 5 to 10 microns.

In the raw mix the ratio of acid to basic materials varied from 1.5 to 1 to 1.0 to 2.2. The charge of coke to raw material varied considerably, the average for rock wool being 1:2.46.

For each 1000 lb. of raw material 630 lb. were recovered as loose wool, 430 lb. as granulated wool, or there was a 200-lb. loss in "shot," in the case of the average rock wool plant.

Mr. Thoenen outlined things that would doubtless have to be covered in specifications in any attempt to standardize the product. It is quite obvious from the figures quoted that practice in the art of mineral wool manufacture is anything but standardized and there are doubtless a great many varieties and qualities of wool on the market.

Hydraulic Stripping

The method of stripping overburden from an unnamed quarry in southeastern West Virginia was described with much detail by Mark Sheppard, of the Pittsburgh Experiment Station of the U. S. Bureau of Mines. The paper will prove helpful to those contemplating this method as the hydraulic mathematics of the problem are worked out in detail.

The cost of operation for four months (3465 hours) was given as $9,616, a little more than half of which was for labor and about one-third for electric power. The amount of overburden removed was 8300 cu. yd., giving a cost of $1.16 per cu. yd. The quarry face was 175 ft. high. This cost is obviously high, but the top of the limestone was badly eroded and removing the overburden by hand methods was doubtless more costly.

Bureau of Mines Work

The remaining papers dealt with the work being done by the Bureau of Mines. Dr. O. C. Ralston, of the nonmetallic division of the Eastern Experi-

ment Station of the Bureau devoted his extemporaneous remarks to work the Bureau might do. He emphasized the practically unlimited field for research in the industrial minerals, particularly silica and silicates.

A paper prepared by J. R. Thoenen, supervising engineer, and Stephen L. Windes, seismologic observer, U. S. Bureau of Mines, on the measurement of ordinary house vibrations should prove useful to quarry operators who are troubled with law suits by neighbors over blasting operations, for it provides data on the vibration of a house from many much commoner causes.

CEMENT NEWS . . .

Complete Cement Storage Plant

HURON-PORTLAND CEMENT CO. has completed the construction of a storage plant at Muskegon, Mich., having a capacity of 60,000 bbl., making the city one of the principal cement distributing centers on the east shore of Lake Michigan. The plant comprises a battery of six storage elevators, packing facilities, and offices. After the Huron-Love slip has been dredged to a depth of 19 ft., all ships may load and unload cargoes of cement without any difficulty. Cement is unloaded with pumps which force the product, under pneumatic pressure, through a pipe line from the boat to the elevators. During construction of the new plant, the freighter, Samuel Mitchell, was used by the company as a floating warehouse.

Reports European Concrete Home Construction

WILLIAM W. MEIN, president of Calaveras Cement Co., San Francisco, Calif., after his return from a five-months' trip to Europe, reports some notable advances in German highway construction, particularly in divided traffic lanes and grade separation. He also commented on the remarkable boom in cement operations in Europe, resulting from large increases in small home construction. Relatively high prices for cement had made possible the operation of what would be considered uneconomical cement plants in this country.

Rebuild and Modernize Two Cement Plants

UNIVERSAL-ATLAS CEMENT CO. is rebuilding the Leeds, Ala., plant and equipping it with modern equipment. A contract for new machinery, amounting to approximately $250,000 was awarded to Allis-Chalmers Manufacturing Co. The contract covers four wet process, raw material grinding ball mills, two air quenching clinker coolers, two clinker grinding preliminators and two clinker grinding ball-peb mills. Clinker grinding capacity is rated from 275 to 280 bbl. of cement per hour. Similar modernization work is being carried out at the Hudson, N. Y., plant.

Cement Imports Cause Concern

FOREIGN CEMENT continues to enter the country in increasing quantities in spite of the fact that cuts of from 12 to 63 cents per barrel have been placed in effect on the Atlantic and Gulf coasts. For the first seven months of the year, imports have averaged 65 percent ahead of the like 1936 period, totaling more than 1,000,000 bbl. Belgium continues to be the leading shipper, followed by Denmark, Germany and the Netherlands. An investigation is now being made on reports that these countries are "dumping" cement in this country in violation of our tariff laws.

Expect Gain for Year In Cement Output

PORTLAND CEMENT PRODUCTION is expected to show an increase in 1937 of more than 10 percent over 1936. The year's output has been estimated at more than 125,000,000 bbl., a decided gain over the 1933 depression low point of 63,500,000 bbl. This 1937 estimate compares favorably with peak production of about 176,000,000 bbl. of cement in 1928. The Portland Cement Association estimates that the industry has 163 mills located in 35 states, capable of turning out 263,000,000 bbl. of cement annually.

Reopen Plant After Month Shut-Down

EDISON CEMENT CO. reopened its plant at New Village, N. J., on October 4, after a month's shut-down. The company's quarries at Oxford also resumed operation. About 300 men are employed.

Open Pacific Coast Cement Plant

Cowell Portland Cement Co., Cowell, Calif., which has been closed since July 16, as a result of a conflict between A. F. of L. and C.I.O. labor organizations, opened on October 1, according to reports from San Francisco. Hearings have been held by the National Labor Relations Board, seeking to settle the controversy. The company contended at one of the hearings that it was engaged in intra-state commerce and therefore was not subject to the Wagner Act.

May Rebuild Alsen Cement Plant

PORTLAND CEMENT CO. will rebuild its plant at Alsen, N. Y., at an expenditure of $3,000,000 for rehabilitation and equipment. This plant has not been in operation for a number of years, and much of the equipment is obsolete and buildings in need of repairs. The report stated construction activities would start about January 1, 1938.

September Statistics On Cement Production

Portland Cement Industry in September, 1937, produced 11,223,000 bbl., shipped 12,773,000 bbl. from the mills, and had in stock at the end of the month 21,389,000 bbl., according to the Bureau of Mines. Production of Portland cement in September, 1937, showed a decrease of 9.1 percent and shipments an increase of 1.2 percent compared with September, 1936. Stocks at mills were 14.1 percent higher than a year ago.

The statistics here given are compiled from reports for September, received by the Bureau of Mines, from all manufacturing plants.

In the following statement of relation of production to capacity, the total output of finished cement is compared with the estimated capacity of 160 plants at the close of September, 1936 and 1937.

	September 1936	September 1937	Aug. 1937	July 1937	June 1937
The month ..	57.1	53.1	54.4	53.1	52.8
The 12 mos. ended	38.1	47.1	47.6	47.8	47.8

"SCAN" is the title of an interesting house organ published from time to time by the Monarch Cement Co., Humboldt, Kans. It is an excellent example of promotional literature, and is profusely illustrated to show various uses of concrete and also contains numerous human interest items.

TULSA PORTLAND CEMENT CO., Tulsa, Okla., plans to install motors and controls, conveyors, transformers, etc., in new cement mill.

Produces Heavy Tonnage of Sand and Gravel with

Unique Dredge and Sand-Recovery Equipment

By T. E. RUST

Vice Pres. & Gen. Mgr., Concrete Materials Corp.

SOME INTERESTING RESULTS in sand classification and recovery are being obtained at the Byron, Ill., plant of the Concrete Materials Corp., Waterloo, Iowa, a plant built to produce a high tonnage of washed gravel railroad ballast. The plant has been designed for continuous production and direct loading without provision for storage. Having a sand requirement in the specification and no bins on which to superimpose sand settling and collecting equipment, existing conventional equipment has been adapted quite effectively to meet conditions.

The plant was erected in 1933 on the property of the Chicago Great Western Railroad to produce ballast for that railway on a long time contract. The specification requires that all material be clean and washed with a top requirement that all gravel pass a 2-in. round opening and not less than 30 percent by weight of the ballast pass the 10-mesh screen. This specification is being met from a deposit averaging 15 percent plus 2-in. round openings, with 40 percent minus the No. 4 sand screen and with gravel to sand ratio of approximately 1:1.

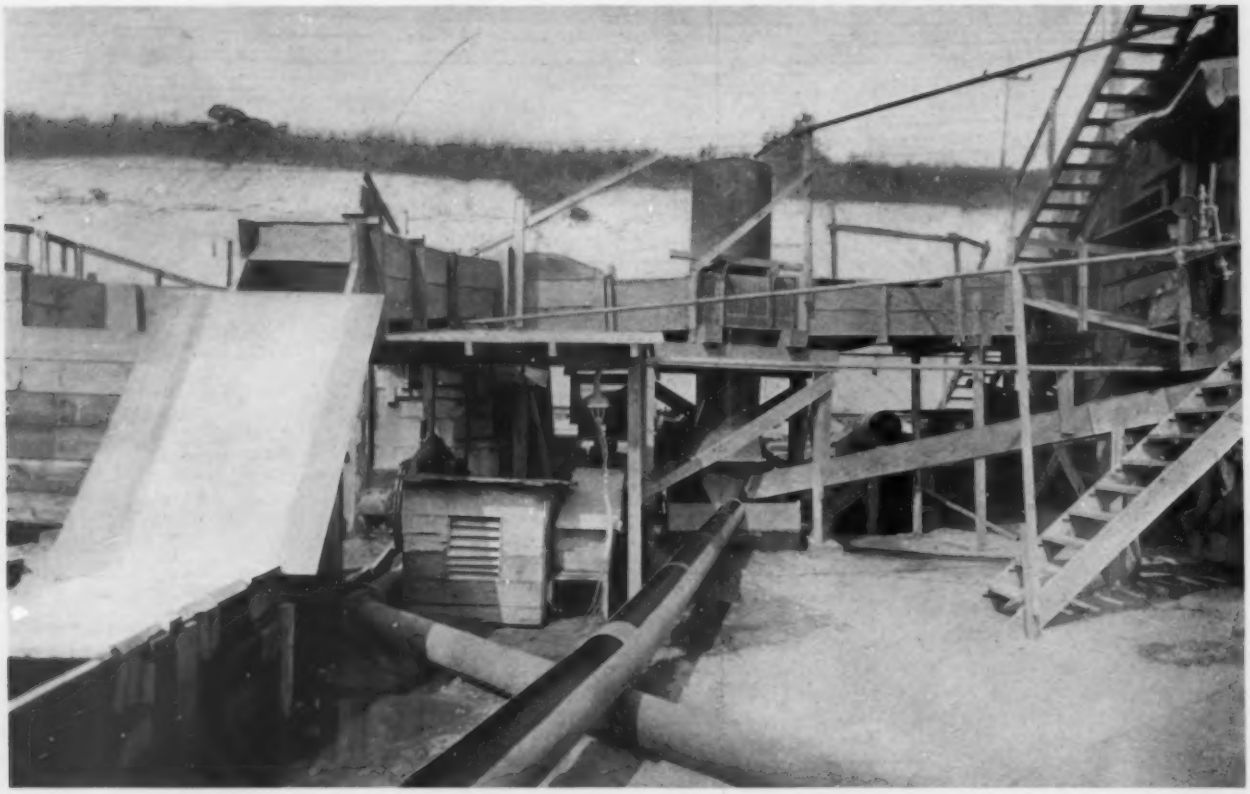
About 200 tons of ballast are being produced per hour. With six men, over 30 cars (70-80 tons) of railroad ballast are produced and shipped daily when operating on a single shift and up to 50 cars or more when, as at present, the plant is operating on a double shift.

Unique Floating Dredge

Other than the method of handling sand, the plant is comparatively simple. Excavation is by a 10-in. "counter-flow" pump (Amsco) on a unique floating dredge, with a 12-in. suction and a 10-in. discharge line. The pump and 300 hp., 2300 volt motor are mounted on a barge consisting of the tanks from five old oil cars and the 40 ft. "Swintek" ladder is mounted on two larger tanks. These tanks are reasonable in price and make an excellent and economical barge.

All solids pass through a 60-in conical revolving screen (Link-Belt) with 2-in. round openings. Oversize is reduced through a Universal 9- x 36-in. jaw crusher and is circulated back through the screen. The minus 2-in. product from the conical screen passes over a stationary sloping gravity screen with 3/16- x 1½-in. slotted openings (No. 4), and that retained on this screen goes by means of a belt feeder directly to the 30-in. belt conveyor, 140-ft., centers, to the ballast-loading tipple. The gravity type screen was adopted in order to rid the plus No. 4 material of the large amount of water delivered by the 10-in. pump so that it could be handled by the belt conveyor without slippage. At first this screen, approximately 12 ft. square, was set at an angle of 45 deg., but this did not prove successful. After some experiment the upper 4-ft. was set at about a 22 deg. slope and the screen now delivers sufficiently dry material with much reduced wear on the screen cloth.

Dredge and pipe line of the Concrete Materials Corp. plant at Byron, Ill. Barge on which pump and motor are mounted comprises tanks from five old oil cars, and the 40 ft. ladder is mounted on two larger tanks



Sand classifier which discharges into feed end of twin screw washer. When there is no demand for commercial sand, the sump pump passes the mixture of sand and water back into the lake

Overflow from the sand classifier in the foreground is flumed to the 18-in. twin screw washer where commercial sand is recovered and discharged on the conveyor to the left. Ballast conveyor is on the right

To prevent segregation and for a uniform distribution of fines in this type of a plant in which ballast is loaded directly to cars, the correct percentage of sand must be introduced, without interruption, on the same belt carrying the No. 4 to 2-in. gravel to the cars.

A 30-in. Shaw classifier is used to gather the proper sized sand grains to be blended with the plus No. 4 product on the belt conveyor. To prevent flooding of the belt conveyor and the conveyor tail pulley, it was necessary to place the classifier to the side of the conveyor near its tail pulley and provide a means of transferring the sand to the belt.

The minus No. 4 sand and water (3000 g.p.m.) from the gravity screen flows through a 4-ft. flume with a slight slope downward to the Shaw classifier. The classifier is set to return the necessary 30 percent, minus 10-mesh product and the coarser fines to the ballast. From 50 to 60 tons of the minus 10-mesh sand and from 20 to 30 tons of 10-mesh to No. 4 sand (representing a total of 80 tons of sand) are recovered for mixing with the No. 4 to 2-in. gravel on the conveyor belt.

The Shaw classifier discharges into the feed end of an Eagle Iron Works twin screw washer (20-in. diameters) set on an angle of 27 deg. The washer bridges the gap between the classifier and the conveyor, upon which it discharges, giving it an added scrubbing at the same time. Being set on a 27 deg. incline, the washer can effectively handle 80 tons of sand per hour while performing a good job of dewatering. The overflow from the washer is flumed back to the lake.

New sand conveyor and bin for loading railroad cars. Sand bin has a capacity of 60 tons or approximately one carload

Recover Wasted Sand

Until this year, the sand in the water overflowing from the Shaw classifier was wasted. This mixture of sand and water passed to a sump and was pumped back into the lake by an 8-in. Amsco pump.

Early in the spring the Chicago Great Western Railroad decided to recover the sand being wasted, and a separate installation was made enabling the recovery of bedding sand or graded sand meeting the Illinois State specifications for commercial sand.

The flume from the classifier was extended and a 9-ft. overflow box was built and Eagle Iron Works 18-in. twin screw washers were installed. The mixture of sand and water passes to the washer box through a perforated plate with 1-in. holes to kill the velocity of the water and to deaden whirls and currents as the water and sand enter the box.

The "tail gate" of the box has two 6-in. planks which may be removed to lower the level if it is necessary to reduce the percentage of fines recovered. An accurate check is kept on the final sand product coming from the washer and the "tail gate" is adjusted accordingly. About 6 or 7 cars (60 tons to the car) of commercial sand are recovered in an average 13-hr. day, sand which was formerly wasted. The screws are set on a 25 deg. incline so that the maximum amount of water may be removed.

Sand Recovery Methods and Equipment

The screw washer discharges directly to an 18-in. belt conveyor, 120-ft. centers, and 16-deg. slope, to a sand bin of 60-ton capacity adjacent to the railroad siding. If there is no demand for commercial sand, a gate is dropped in the flume so that all water and sand coming from the Shaw classifier goes to the sump and is wasted. The 60-ton sand bin provides a reserve of one railroad car of sand. There is not much difficulty in meeting the Illinois specification of 5 percent minus the 50-mesh, but often a slight adjustment is needed for intermediate sieve tests. This is readily varied by changing the gravity screen openings or by by-passing some of the minus No. 4 sand and water around the Shaw classifier.

Sand from the classifier on the right is passed into the 20-in. twin screw washer which discharges into the ballast conveyor. Set on a 27 deg. angle, the washer can effectively handle 80 tons of sand per hour

Open New Deposit In Nebraska

PRELIMINARY WORK HAS BEEN STARTED in opening a new gravel deposit near St. Edward, Nebr. Jasper Cruise, Leslie Green and Charles Brown are interested in the project. Orr T. Nichols of Omaha, Nebr., installed the pump and some of the machinery, and Frank McComb is in charge of building chutes and erecting machinery. The gravel pit is on the O. H. Flory farm south of St. Edward.

Working Silica Rock Deposit to

PRODUCE ACCEPTABLE SAND SIZES

By JOHN S. HIPPLE

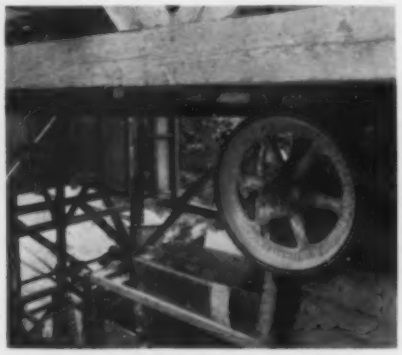
President, Temple Slag Co.

TO PRODUCE A BUILDING AND CONCRETE sand of acceptable size gradations from a silica rock deposit, the Temple Slag Co., Inc., Temple, Penn., designed and built a new sand plant which is now in operation. The company has been producing stone and sand on a small scale at this location since 1917. Originally stone was hauled to the single crusher in wheelbarrows, the production being half stone and half sand.

Prior to the construction of the new plant, the rock formation, testing 97.3 percent pure silica, had been quarried to a depth of 75 to 80 ft. Much of the stone was well-drilled and shot down, but the new plant was built not only to increase production but also to eliminate uphill hauling.

The deep face was abandoned and the new plant was constructed above the old quarry, going into production May 1, 1937. Natural sand and stone sand are being produced exclusively at this large aggregate producing plant.

Decomposed silica rock is found in the upper 15 or 20 ft. of the deposit, much of it occurring as natural sand but interspersed with some rock, and followed in the lower strata by rock. Operations are at present confined to this upper strata, where little or no blasting is needed. The sand is very sharp, hard and rough in its natural state. Fortunately, no stripping is required, and only a few trees and brush need be removed.



Primary crusher reduces stone to minus 2-in. size. Throughs pass to a rotary screen with ¾-in. openings

A Mack truck is loaded by a Byers Bearcat ⅝-yd. gasoline shovel and hauls about 6 tons of sand and rock (usually not requiring sledging) to a 10-ton hopper feeding the crushers below on the hillside. A grizzley, between the primary crusher opening and the hopper, by-passes all minus ¾-in. stone to a rotary screen below the crusher. All other stone is reduced to minus 2-in. through the Beaumont 10 x 20 primary jaw crusher. The crusher throughs pass to a 4- x 2½-ft. rotary screen, with ¾-in. openings.

Minus ¾-in. stone from the screen by-passes the Kennedy No. 19 gearless gyratory secondary crusher below to an 18-in. belt conveyor, on 45-ft. centers, which carries it direct to the sizing screen. Plus ¾-in. stone, after passing

Portable loader in old quarry storage yard employed for loading trucks. Gasoline shovel also is used to speed up handling of truck shipments, and is available for other work

through the reduction crusher, joins the by-passed stone on the belt conveyor.

This conveyor discharges to a Kennedy 3x6-ft. double-deck vibrating screen, the upper deck merely serving to balance the load on the screen. Minus 3/16-in. material (natural sand) from the screen is chuted direct to a Kennedy wash box. Here the sand is washed and given a final rinse, by maintaining the water level in the box above the prescribed level. Wash water is furnished from a nearby creek by a 3-in. Marsh pump connected to a pipeline reduced to 1½-in. diameter at the wash box. A 16-in. belt conveyor, on 20-ft. centers, discharges washed natural sand from the wash box to open storage over the bank into the old abandoned quarry.

Dry Pan Grinds Stone to Sand Sizes

Plus 3/16-in. stone from the vibrating screen goes to a surge bin feeding a Chambers 7½-ft. dry pan below, where it is ground to sand sizes. The bottom of the dry pan consists of a manganese steel plate screen with 3/16-in. openings, through which the stone sand passes when ground to the desired size. The stone is highly abrasive, and previous to installation of the manganese steel plate screen would wear out the ordinary steel plates in a matter of hours; the manganese plates are replaced once each season. Grinding tires are adjustable, to permit maintaining even pressure on the stone particles as the tires become worn.

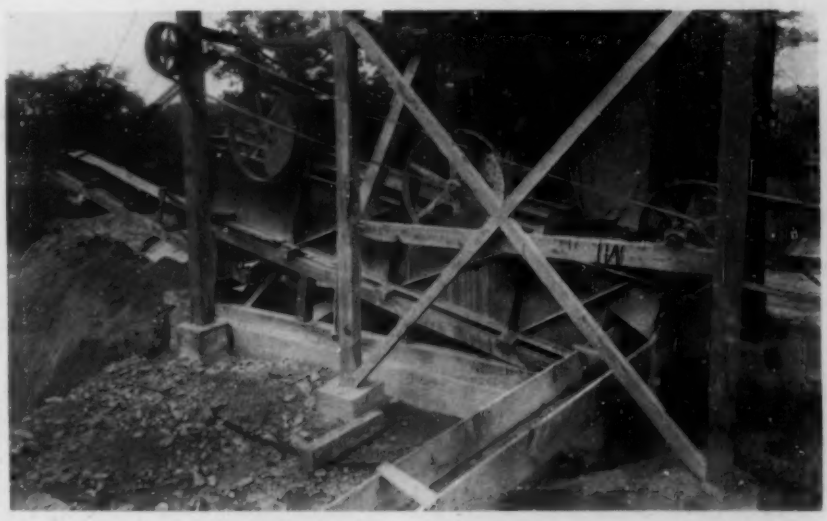
Stone sand (minus 3/16-in.) passing the screen plates in the dry pan is elevated by a 15-ft. bucket elevator to a small stationary screen with 3/16-in. openings. Rejects from this screen return to the dry pan, while the throughs are carried over a belt conveyor on 80 ft. centers and discharged over the bank to open storage. The stone sand can be diverted in any proportion in the chute to pass to the wash box if it is desired to mix stone sand with natural sand.

Normally, about 250 tons of sand are produced in an 8-hr. day of which about 40 percent is stone sand. Both sands are sold for concrete aggregate. Stone sand has a ready market for use in mason's work, plastering, cement finishing and in foundry work for furnace bottoms. Both sands meet requirements for size gradation and maximum silt content as specified for grade A usage. Shipments are made by trucks, loaded in the old quarry by a Barber-Greene portable loader and an Insley ½-yd. gasoline shovel.

A 50-hp. motor drives, through a line shaft, the two crushers, the dry pan and the wash box.

Dry pan, with adjustable grinding tires, pulverizes stone to sand sizes. The bottom of the dry pan is a manganese steel plate with 3/16-in. openings

Gyratory secondary crusher for reduction of ¾-in. stone. Minus ¾-in. stone by-passes crusher and is carried by belt conveyor to sizing screen



Wash box for cleaning sand receives its water supply from a nearby creek from which it is pumped. A belt conveyor discharges the washed sand to open storage into the old quarry

Interesting Developments In

Tube Mill Reground Calcined Gypsum

By A. M. TURNER

Supvr. of Plaster Quality
Three Forks Portland Cement Co.

PRODUCTION OF PLASTER by the process of grinding calcined gypsum in a tube mill, or ball mill, is reported to have been developed and put into practice about 1911. However, it was during 1921 and 1922 that two patent applications were filed which covered the process.

Patent No. 1,392,574 dated Oct. 4, 1921, was granted Warren E. Emley for his tube mill process of making plastic calcined gypsum. The advantage Mr. Emley claimed for his process of tube mill grinding is expressed in the following paragraphs, which are copied from his patent:

"I find that if calcined gypsum is ground severely so as to liberate the water, but in such a way that the water cannot escape, the resultant product has radically different properties. It is now plastic, rather than non-plastic. This can be proved by testing the material by means of the Carson blotter test as described in the Transactions of the National Lime Manufacturers Association, 1916, p. 175, or by means of a plasticimeter. It can be used alone as the white coat of plaster, and can be used with at least six parts (by weight) of sand for scratch or brown coats. When compared with the original material, it will be found to require more water to mix it to a given consistency, that it sets more slowly, and that it will develop higher tensile strength after setting. To use this material as a wall plaster, it will, of course, be necessary to retard it, using for this purpose the ordinary reagents which are used in the manufacture of wall plaster from calcined gypsum."

"If it is not practicable to grind the calcined gypsum in such a way as to prevent evaporation of the liberated water, the same end can be attained by adding, either before or during the grinding, enough water to make up for the quantity evaporated, so that the final product will contain approximately one molecule of water to two molecules of calcium sulphate.".

Patent No. 1,457,161, dated May 29, 1923, was granted Robert E. Haire, for his tube mill process of making plastic gypsum. The following quotations from Mr. Haire's patent will describe what he claims for his patent:

"My invention relates to the production of plastic gypsum, such as that described in Letters Patent of the United States No. 1,392,574 granted to Warren E. Emley Oct. 4, 1921. In carrying out the process, I take calcined gypsum as it comes from the kettle after the first settle and pass this through a tube mill with exclusion of air, so that in the grinding operation the water content will not be allowed to evaporate. The calcined gypsum as it comes from the first settle in the calcining action contains about six percent of moisture, and this moisture is retained in the material or in the tube mill wherein the grinding process is carried out."

Mr. Haire next describes the principle of his tube mill which in general operation is similar to those used at the present time in cement mills and gypsum plants. Quoting further from the above patent:

"Several tons of the material, having been introduced into the cylinder and rotated with the exclusion of air, the material is ground with its water content and discharged through the circumferential openings. As discharged from the tube mill, it is found that it is sufficiently plastic for use as the white coat of plaster without further treatment. Plastic gypsum is also very much superior to the ordinary non-plastic gypsum or calcined plaster in making hardwall plaster, gypsum blocks, or for any other purpose where ordinary calcined plaster or plaster Paris is used."

The two above patents appear to cover the same general principle; that is, first-settle, calcined gypsum is ground in a tube mill, excluding air from outside sources. The objective of the process is to produce a more plastic calcined gypsum. The theory of this accomplishment is based on the fact that in grinding the stucco, some of its water is freed and then re-absorbed by the calcium sulphate. This theory of reabsorption is discredited by some men of the present day gypsum industry. However, whether or not the theory is correct the objective of producing a more plastic material by tube mill regrinding has been very definitely accomplished. Another deviation from the original intent of the patents is that the process seems to have been developed primarily for making a plastic material for white finish coat plastering. However, present practice is to make the ordinary wall plasters by the tube mill process, but not plaster for finish coat work.

Development of the Process

One large gypsum manufacturer claims to have used the tube mill since 1911. While the product made by this installation was apparently satisfactory no particular emphasis seems to have been placed upon its merits. As a matter of fact the outstanding characteristic which attracted attention to plaster made with this mill was the increased bulk of the material. Larger sacks had to be secured in which to pack the product, and the larger package required for the product was a feature which was used to some extent in advertising the new plaster. Granting that tube mill plaster always has been a superior product, it is somewhat difficult to account for the fact that the use of this type of mill lay practically dormant for a period of about 20 years. One possible explanation for this situation may be based on an economic fact. The operation of tube mills is definitely more expensive than several types of grinding, and it is also difficult to convey the product through the various types of machinery and get it into the bags. Such conditions may have discouraged the expansion of the process until competition became so keen that plaster companies were forced to improve their product even if the new method raised the cost of production.

Beginning about 1928 or 1929, there was a movement toward adoption of the tube mill for use in regrinding calcined gypsum, but it was not until about five years later that there was a definite trend to the installation of tube mills in the gypsum industry. Following the blanket installation of ball mills a high-powered advertising campaign was initiated, advancing claims of superb qualities in the plaster recently developed by each manufacturer's process. Such names as plasticized, microscopic and patented plaster were among the terms used in the advertising literature. However, the important principle behind each development was the use of a tube mill for regrinding.

Still further advances in grinding installations have been made during the past year and a half. Since the larger mills with tube grinding installations could reach out into the sales territories served by smaller mills, which hoped to avoid the expense of the installation and operation of the new equipment, the result was a loss of business to the smaller mills. However, those plants which were losing business soon met the emergency by making the proper installation, and at present there is probably only one gypsum company among the larger producers and a few smaller producers who do not regrind calcined gypsum with a tube mill. Probably the very latest development in the trend toward tube mill regrinding occurred during 1936, when some gypsite mills in the southwest installed tube mills.

Regrinding Improves Quality

Unquestionably, ball mill regrinding imparts outstanding characteristics to the plaster. Probably the most important of these is the increase in plasticity. There are numerous ways of measuring this characteristic such as by the use of the Carson blotter test, the Emley plasticimeter, and by the feel of the samples as they are tested in the laboratory. However, the real test comes from the response of the mechanics who use the plaster, and this test has proved beyond question the improvement which has been accomplished. It may be interesting to mention at this time that fresh plaster, made by other grinding processes, sometimes meets as favorable response as that made by the newer process. However, the material ground by the old methods soon shows a loss in desirable working qualities as it becomes older. This loss of plasticity is not apparent in the tube mill reground plaster.

Another highly pleasing feature in tube mill reground plaster is its ability when used for sand float finish, to float uniformly, resembling the uniformity of sand paper rather than a surface having alternately smooth and rough areas all over the wall. This is one feature which can be clearly demonstrated by using the old style plaster on an adjacent wall.

Claims of increased strength are made for plaster produced by this newer process, but whether or not this assertion has a substantial foundation is more or less a question. This quality for ordinary wall plaster is immaterial because the strength of plaster made by any standard method is sufficient to meet the requirements for which it is used.

Tube mill regrinding increases the bulk of plaster. The amount of increase depends upon the intensity of the grinding action to which the stucco is subjected. In general, the greater the bulk of the plaster the more sand it will carry, and tube mill reground plaster is generally better plaster for carrying sand than plaster made by other methods. However, most plasters will carry as much sand as should be used to insure proper strength, and a plaster with too large a sand carrying capacity is not desirable as it leads to oversanding and resultant weak walls.

Objections to Tube Mill Plaster

Granting that plaster reground in a tube mill makes a product superior in quality to plaster made by the older processes, there are some minor objections to the product. One objection is that most tube mill plaster contains flat hard flakes. To give a rough approximation of the amount of these flakes which may be found in the plaster, it is safe to say that a quantity equal to one or two percent of the total amount screened will remain on an 8-mesh sieve.

There is some difference of opinion about the way these plaster flakes are formed, but one theory which seems to be reasonable, at least in part, is that the finely ground stucco becomes compressed and packs against the balls in the mill or its walls. This compressed stucco breaks loose and passes out of the mill in the form of flakes. It seems that the grinding action can be regulated in one or more ways to reduce the tendency to flaking. For instance, increasing the grinding action by lessening the feed going into the mill or adding more balls will reduce flaking. However, these methods are not always practicable for when the stucco is ground too fine it becomes almost impossible to pass the product through the various equipment in which it must travel. The temperature to which the gypsum is calcined is also a controlling factor in the formation of flakes.

The flakes in question will mix readily with water and make just as plastic a mortar as the rest of the plaster. In reality they do no harm to the plaster. The objection to them comes about in this way. Some plasterers will screen the fiber out of plaster when they want unfibered material. Some of these flakes will appear on the screen with the fiber and their presence may cause the workmen to suspect that these lumps are some foreign material in the plaster which should not be there. Since tubed plaster has gained such general use the trade has become pretty well accustomed to the flakes which are practically always present to some extent, and less comment is made on this subject than when the material was introduced.

Another important characteristic of tube mill reground plaster is that it will not mix readily with lime putty. The old style plaster, with a texture more like sand, will mix much better with putty for white finishing work. Of course, the proper practice when doing white coat finishing is to buy a special finishing plaster (usually called gauging plaster) to use with the lime putty. Gauging plaster is manufactured from the whitest of gypsum, and is manufactured in such a way that it will mix readily with lime. In certain territories, at least, the past practice has been to buy only the regular fibered plaster and use it for all purposes. When doing white finish work the fiber was screened out and then the plaster was used with lime putty. When this method was tried with a tube mill ground plaster, it was found almost impossible to get a uniform mixture, and in the event the gypsum plaster was not as white as the lime the wall would dry out streaked. Consequently, it has required considerable missionary work to teach the plastering trade that to get the best results with their lime putty work, it was necessary to buy a gauging plaster which was especially manufactured for the purpose. The final result simply means that the manufacture and use of gypsum products is becoming more specialized.

Manufacturing Ideals

Manufacture of tube mill plaster has not been a simple process. One reason is probably the fact that these mills have been installed in plants which were not designed for such equipment, and the installation has had to be done on the basis of making the best of the facilities at hand.

Following is a description of the general method which seems to be considered the best practice:

The crushed gypsum is ground by Raymond mills, Buhr stones or some other grinding equipment to a fineness from 80 to 95 percent through 100 mesh. This material is calcined in the customary manner. The stucco is next transferred to a storage bin where it may cool to some degree before going to the tube mill. Stucco being fed into the tube should not be hot (preferably less than 180 deg. F.), and some me-

chanical control must be used to maintain a constant feed into the mill. Drag chains under the storage bin seem to be the most acceptable equipment for this purpose.

The rate at which the stucco is fed into the mill is determined by the size of the mill and the number of balls it contains. A rough guide for the amount of feed can be considered as about one ton of stucco per hour for every two tons of balls in the mill. Balls of from 1-in. to 1½-in. in diameter seem to be the most effective for the purpose.

Of course there are various factors which help to determine the output of the tube, and this can only be regulated by the quality of the product which is being made. The quality of the product is determined principally by its grind and plasticity. Using the Emley plasticity machine, it is found that stucco with a plasticity figure of 150 to 180 will reach a figure between 250 and 350 after being reground in the tube mill. A typical screen analysis of a well tubed plaster will be close to the following table: On 8-mesh, 0 percent, on 14-mesh, ½ percent; on 40 mesh, 50 percent; on 100 mesh 80 percent; and through 100 mesh 15 percent.

To get the best results, the stucco being discharged from the tube should be about 235 to 245 deg. F. The consistency of the discharge is normally higher at the discharge than at the feed, and the set will usually run from two to five minutes slower at the discharge end.

The foregoing description has been tabulated to show the practice which is considered ideal, at least by some of the biggest producers of gypsum products. However, tube mill reground plaster is being made at some factories which deviate from these ideals by a wide margin, and the product is still meeting with very favorable response.

Manufacturing Difficulties

To those who have not gone through the experience of manufacturing a tube mill reground plaster, the process will no doubt sound like a simple problem of installing a piece of grinding machinery and starting the wheels turning. Such is not the case, however, because endless difficulties are encountered in handling this finely ground plaster.

In the first place, if the temperature in the tube mill is too hot or the grind is too fine the contents of the mill will not discharge and the mill fills up. When this happens, there is nothing to do except to dig out the mill. Some mills use a method of air sweeping to assure a satisfactory discharge from their mills. The tube mill must be heated up in cold weather before using its product, otherwise condensed water sets up some of the stucco in the mill and causes fast set trouble.

Having removed the material from the mill, precaution must be taken to facilitate its further transportation. The customary spout incline for old style plaster will not be steep enough for this new product; larger, steeper spouts therefore must be installed. Screw conveyors probably will have to be increased in size and speed to take care of tube mill reground plaster. The same thing applies to elevators. Furthermore, it usually proves that the belt drives which had been adequate for driving the conveyors and elevators when the old style plaster was handled, will fail to pull the load with the new plaster. Possibly wider pullies and belts will do the trick, but it is not unusual to resort to a positive chain drive to pull the load.

Having finally gotten the plaster into the bins, another difficult problem is encountered when it comes to taking out the material. A relative comparison of the way the two kinds of plaster will drain out of bins works out somewhat like the following example. Assume that a bin is 15 ft. square and 40 ft. deep, with a gate one foot square in the bottom through which to draw the contents of the bin. When this bin is full of the old style plaster, at least two-thirds of it can be drawn out through the hole in the bottom. The results are quite different if this same bin is filled with tube mill reground plaster. The only gravity drainage from this bin through the hole in the bottom will be that which will drain out from directly above the gate. This free drainage will empty a space in the bin cylindrical in shape with a diameter at the bottom of about 3 ft., and the size of the opening would not be much more than 5 ft. until it gets near the top of the bin. The foregoing figures are only relative, but serve the purpose quite accurately. It is not unusual to have as little as 25 percent gravity drainage from a plaster bin filled with tube mill reground plaster. It is a common practice to have openings at various places in bins through which air jets may be inserted and the plaster blown loose to some extent by the air pressure.

Packing Tubed Plaster

Difficulties in manufacturing tube mill reground plaster follow through the process right up to the time the plaster is put into the sacks. Packing this material presents its share of difficulties, especially if water proof bags are used which will not readily expel the air. Some of the plans which have been resorted to in order to satisfactorily pack bags on a Bates machine are as follows: Air jets are inserted in the hopper directly above the shaft in the Bates machine. Air may be blown through these jets in order to knock down the bridge of plaster which is prone to build up above the shaft and paddles. A device has recently been developed by the Bates Valve Bag Corp., whereby a small air line is run into the spout on which the bag fits. A push button along the side of the spout controls the air stream. The men employed as packers by this means may blow the tube clean at will. In some instances it has been found advantageous to increase the speed of the Bates paddle shaft by approximately 200 r.p.m., which exerts greater force in driving the plaster into the bag.

Future Grinding Developments

The trend toward tube mill regrinding of calcined gypsum has been so general in recent years that it is hard to think in terms of any other system replacing the tube mills. About three years ago, there was a machinery company which experimented extensively on a machine to replace the tube. The quality of the product produced with this new type of equipment was quite acceptable, but from a production angle it apparently did not produce satisfactory results. For many years plaster was quite generally made by grinding only before calcination. This process of course is more economical than adding the burden of regrinding the calcined material. The old style process did not, of course, meet all the requirements for making a quality product. However, it seems that an ideal goal toward which to work for future development would be some process for giving gypsum a type of initial grind which would calcine into a plaster having as desirable properties as are now obtained by regrinding in a tube mill after calcination. Possibly the answer will be somewhat the reverse of this scheme; that is, the initial grinding will be reduced to a minimum and the quality control of the product will be made up through regrinding. To some extent this scheme is approached by plaster made in rotary calciners and reground in a tube mill.

TRACES OF ALUMINUM DUST in silica-laden air tend to inhibit silicosis, according to a report from Toronto, Canada. This conclusion was made after tests had been made on rabbits. Other researches in the past have concluded that certain other dusts, including calcium carbonate also may have some protective action and may assist the lungs in dust elimination. However, the best known methods of preventing and controlling silicosis are segregation of dust-producing operations, dust control, ventilation, protective devices, good housekeeping and medical supervision, including periodical X-ray chest examinations.

View showing principal buildings of interesting calcite plant operated by Harry T. Campbell Sons at Texas, Md.

Equip and Remodel Calcite Plant for

FINE CRUSHING and SCREENING

By STAFF EDITOR

HIGH CALCIUM FINE STONE PRODUCTS for a myriad of applications and sold nationally are being manufactured at the calcite plant of Harry T. Campbell Sons at Texas, Md. The plant was purchased from the Maryland Calcite Co., four years ago, and has been remodeled and enlarged considerably to manufacture a highly diversified line of products. Originally only chicken grits and stucco dash were manufactured at the plant.

The formation, about one quarter mile from the plant, contains a highly crystalline rock, testing better than 97 percent pure $CaCO_3$. Calcite is being quarried from a 20-ft. face.

After blasting, it is sledged to 12-in. and under and hand-loaded into 3-ton trucks for delivery to the plant. Rock is stored at the elevated plant hopper housed in an open shed, and is fed to the crushers by hand. Stone to be rejected is picked out in the shed and hauled to trucks in a car operated over narrow gauge track.

Fine Crushing Operations

After the calcite is passed through the New Holland primary jaw crusher, it goes through a series of three 10 x 12-in. New Holland rolls in tandem, where all calcite is reduced to minus ¼-in. size.

From the rolls, the stone is elevated by bucket elevator and carried by screw

Tube mill for production of "Cameline White" is driven by a flat belt drive from a 125 hp., 6 cyl. Diesel engine

Diesel engine installation for operation of the new tube mill shown in the illustration to the left

conveyor for distribution to two New Holland double-deck 3 x 6-ft. screens. Oversize is returned to the bottom rolls and re-circulated. The size rejected varies according to whether a coarse product is desired or fines are needed for a feed to the mills for finer grinding.

The throughs from these screens are passed over two similar double-deck screens, generally with No. 8 mesh cloth on the top decks and No. 20 on the bottom decks. The No. 8 stone, the 8 to 20 stone and the minus 20-mesh stone go directly to bins.

The minus 20 product is taken from its bin and elevated to a Tyler 3 x 5-ft. single-deck screen with No. 65 mesh screen cloth. The No. 20 to No. 65 product passes to a bin, and serves as the feed for the mills for further reduction. The 65-mesh to dust product goes to a bin.

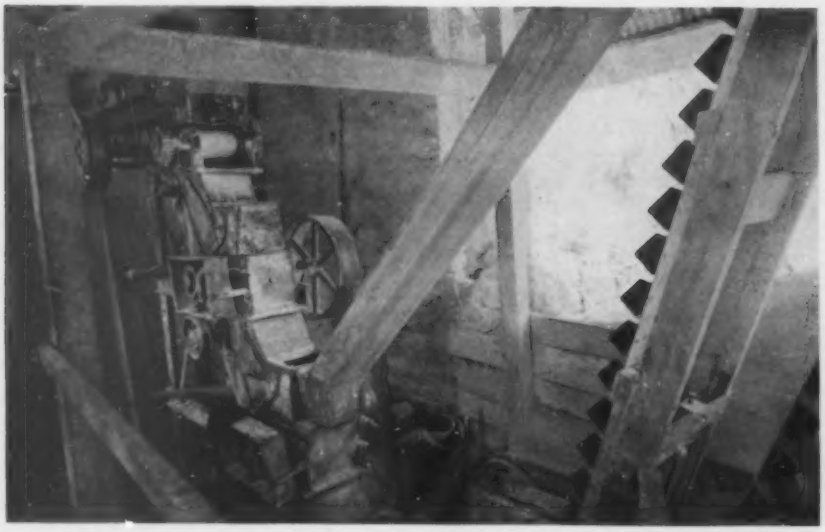
An 18-in. x 8-ft. ball mill for the manufacture of lime flour. This mill is driven by a 60-hp. gasoline engine

Diversified Line of Products

Various products made over these screens, their storage capacities and markets are as follows:

Mesh	Capacity	Use
(1) 10-20	35 tons	Water filtration, small chicken grit
(2) 8-20	60 tons	Water filtration, small chicken grit, cast stone roadways
(3) 16-30	8 tons	Canary bird grit
(4) 10-dust (white sand)	12 tons	White sand, block facing, cement work
(5) No. 0	10 tons	Cast stone, medium chicken grit
(6) No. 20 mesh	12 tons	Stucco
(7) 65 mesh flour	20 tons	Agricultural, cast stone, surfacing
(8) 65-20	20 tons	(a) feed for mills (b) cast stone, canary grit, play boxes
(9) 4-8	20 tons	Large chicken grit, cast stone, stucco

These products are regularly manufactured. In addition, by by-passing the lower roll crushers and setting screen openings accordingly, larger sizes of calcite are produced for special purposes and bagged. Among these products are: the ¼ to ½-in. size, marketed for use in raising Narcissus bulbs.



Series of three rolls for reduction of calcite to minus ¼-in. As shown, screen rejects return to lower rolls

The production of flour began four years ago with installation of a Hardinge 18-in. x 8-ft. ball mill, followed by the manufacture of "Cameline White" two years ago. The capacity for these two products was increased substantially several months ago with installation of a 20 x 5-ft. F. L. Smidth tube mill. The Hardinge mill is driven by a Caterpillar 60-hp. gasoline engine, and the F. L. Smidth tube mill is driven by a flat belt drive from a Caterpillar 125-hp. 6-cyl. Diesel engine. Fuel consumption of the Diesel engine has averaged five gal. per hour. The rest of the plant is electric motor-driven.

The No. 0, 20-65-mesh, 65 minus and 8-20 mesh may be used for feed to either mill for the production of "Cameline White." The smaller sizes feed direct to either the ball mill or tube mill, while the No. 0 and 8 to 20-mesh products are further reduced through a New Holland grinder before entering the mills.

Products of the ball mill and tube mill are flour (minus 65-mesh) and "Cameline White" (99½ percent through the 325-mesh sieve). A Sturtevant 10-ft. air separator is closed-circuited with both mills, either one or both of which may be operated at any time. Flour is made incidental with the manufacture of "Cameline White." When the demand is for "Cameline White," the separator rejects are returned to either mill. If flour is desired, the rejects are passed over a Tyler 4 x 6-ft. single-deck screen, where flour is taken out, and the rejects from the screen return to either mill.

The capacity of the plant for any one product is variable, being dependent on the other sized products manufactured.

About seven tons of calcite pass the primary crusher jaws per hour, which is distributed throughout the plant. The output of "Cameline White" varies between 1½ to 2½ tons per hour, according to the product being fed to the

One of 12 locations in the plant where various products are bagged

mills. The average production of flour is 4½ tons per hour.

About 25 men are employed when the plant is operating at full capacity. There are 12 points in the plants where various products may be bagged out. The finer products are packed in 50-lb., 80-lb. and 100-lb. paper bags, while the coarser sizes are packed in 100-lb. burlap bags.

The operations of this calcite plant should prove to be of general interest to the industry, as they demonstrate the possibilities in merchandising a large number of limestone products.

SAND and GRAVEL . . .

Improvements at Ohio Gravel Plant

KINSMAN SAND & GRAVEL CO., Andover, Ohio, which began operations several years ago, has been very active in building up its business and in modernizing its plant. The company recently installed a new stone crusher and gasoline shovel, and operates two washers to condition sand and gravel for use. Wm. Adrian is local manager, Leonard Bull is secretary, and Roy Troyer is truck manager at Aurora, Ohio.

Sand and Gravel Company In the Ready-Mix Business

MIDDLETOWN SAND AND GRAVEL CO., Middletown, Ohio, now has facilities to furnish ready-mix concrete in addition to sand, gravel, and other building materials. In addition to the builders' supplies, the sand and gravel company has an excavating and dump truck service. A fleet of special trucks are available for any demand of this kind.

Another Gravel Company for Louisiana

VERNON GRAVEL CO., INC., Rosepine, La., has started operations in its new gravel pit near Rosepine. The new company was organized to take advantage of the recently passed 10-year tax exemption law. Officers of the gravel company are: Monroe Jeane, president; R. D. Moore, vice president, and Mrs. Beda Jean Stringfield, secretary-treasurer.

Gold Found In Sand and Gravel Deposit

BELLAMY SAND AND GRAVEL CO., Correctionville, Ia., has found traces of gold in its sand and gravel deposits. However, until some inexpensive way to salvage the gold is discovered, the gravel will be worth considerably more than the metal. The traces of gold in a pure state were found through a panning process.

Sand-Lime Brick Production and Shipments

THE FOLLOWING DATA are compiled from reports received direct from producers of sand-lime brick located in various parts of the United States. They may be considered representative of the industry.

Eleven active sand-lime brick plants reported for the month of September and ten active plants reported for the month of August, statistics for which were published in September.

Average Prices for September

Shipping Points	Plant Price	Delivered Price
Detroit, Mich.	——	$16.00
Grand Rapids, Mich.	$11.00	13.00
Watertown, Mass.	11.50	12.50
Mishawaka, Ind.	9.25	——
Milwaukee, Mis.	10.00	12.50
Minneapolis, Minn.	10.00	——
Syracuse, N. Y.	14.00	16.00 C.L.
	16.00	20.00 L.C.L.
Saginaw, Mich.	10.90	——
Pontiac, Mich.	12.50	15.00

Statistics for August and September

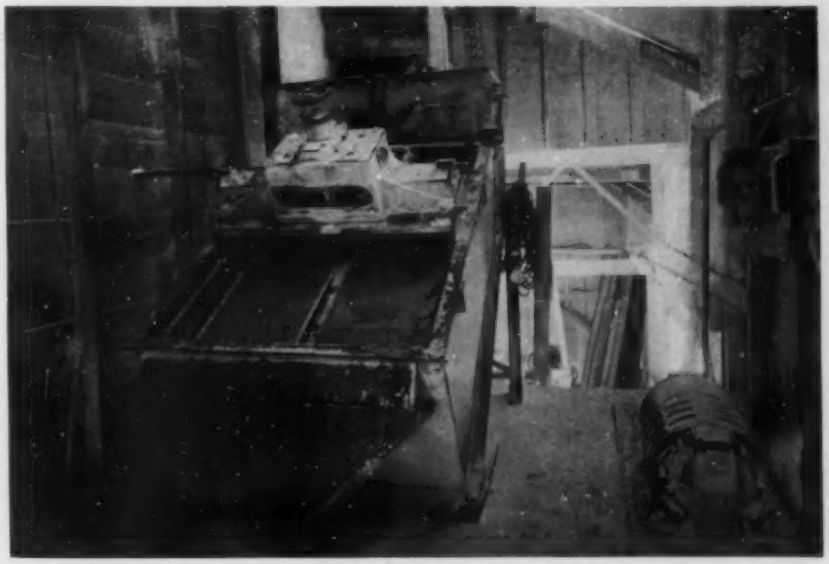
	Aug.†	Sept.*
Production	3,821,985	3,811,975
Shipments (rail)	616,200	330,200
Shipments (truck)	2,961,590	3,235,349
Stock on hand	2,390,000	4,926,971
Unfilled orders	3,397,114	2,376,000

† Twelve plants reporting; incomplete, five not reporting unfilled orders.

* Eleven plants reporting; incomplete four not reporting unfilled orders.

PRODUCERS GRAVEL CO., Webb City, Mo., has filed a petition for reorganization under section 77-B of the national bankruptcy act. Liabilities were listed as $24,000.89 and assets as $12,329.41.

W. G. MITCHELL, Tuskegee, Ala., has announced plans for the construction in the near future of a large plant near Tuskegee for processing sand and gravel. Mr. Mitchell is a local railroad executive.



Single-deck screen for separation of the minus 65-mesh product from the No. 20

National Safety Congress In Kansas City

GETS DOWN TO FACTS AND CASES

In Industrial Mineral Industries

SAFETY TRAINING and the elimination of hazardous practices in industry were emphatically stressed at the meetings of the National Safety Congress set aside for the various industries. Meetings were held the week of October 11 in the new municipal auditorium at Kansas City, Mo., in connection with others designed to promote safety and prevent loss of human life on the highways, on the streets and in the home.

Meetings of particular significance to producers of industrial minerals were those in which the quarry and cement sections met jointly to discuss progress made in recent years in a determined fight to reduce accidents and human suffering, and the steps to be followed in carrying on the gospel of safety.

When chairman Fred B. Hunt of the Cement Section, National Safety Council, called to order the annual meeting of the Cement and Quarry sections, he faced a crowd of several hundred that filled every available space and exceeded all previous records.

Officers

In opening the Tuesday afternoon meeting, chairman Hunt proceeded directly to the first item of business, the report of the nominating committee and annual election. The chairman of the nominating committee, R. B. Fortuin (Pennsylvania Dixie Cement Corp.), read the report, placing in nomination the following to serve as officers during 1938: General chairman, F. B. Hunt, Nazareth Cement Co., Nazareth, Penn.; vice chairman, A. B. Sunderland, Ash Grove Lime and Portland Cement Co., Kansas City, Mo.; secretary, A. J. R. Curtis, Portland Cement Association, Chicago, Ill.; news letter editor, Jack Dempster, Canada Cement Co., Montreal, Can.; chairman, membership committee, Col. H. A. Reninger, Lehigh Portland Cement Co., Allentown, Penn.; chairman, engineering committee, Wm. Moeller, Lone Star Cement Corp., Dallas, Tex.; chairman, poster committee, J. B. Kennedy, Huron Portland Cement Co., Detroit, Mich.; chairman, highway committee, M. A. Koffman, Southwestern Portland Cement Co., Los Angeles, Calif.

D. D. Fennell, president, National Safety Council

Members of the executive committee at large include R. B. Fortuin, Pennsylvania-Dixie Cement Corp.; Gordon C. Huth, Universal Atlas Cement Co.; E. Posselt, Lone Star Cement Corp.; J. B. Zook, Great Lakes Portland Cement Corp.; P. N. Bushnell, Missouri Portland Cement Co.

As of general interest to the majority of cement men present, Col. Reninger announced the plans of a special committee of which he is chairman, to fittingly celebrate the completion of 25 years of organized safety work in the cement industry. The plan includes an appropriate observance during the annual meeting of the Portland Cement Association in Chicago and a special program in each individual plant through the country, all at the identical hour, on the day before Thanksgiving.

In Review

I. F. LeGore, safety engineer of the Portland Cement Association, followed with an excellent paper carrying his audience back a quarter of a century, then bringing accident trends in the industry down to happenings of the last few months. Mr. LeGore reviewed briefly the quarter-century of progress in safety since the birth of organized safety work in the portland cement industry in 1912.

The original accident prevention committee of six cement company executives found that in 41 cement companies 19.4% of the men suffered disabling injuries in 1909, 13.3% in 1910 and 15.4% in 1911. Since then safety educational work has been broadened and developed from the first program of engineering revision, provision of physical safeguards, protective clothing and equipment and safety educational work with splendid cooperation and support of the member operating units, said Mr. LeGore.

By 1922, the number of disabling injuries and fatalities was reduced to a point where there were 41.7 for each one million man-hours worked by the industry, as compared to frequency rates of 97.0% for 1909, 67.0% for 1910 and 77.0% for 1911.

In 1923, beginning of another decade of safety accomplishment, the Portland Cement Association's safety trophy was first offered and awarded to a plant in 1924 for its accomplishment of a years' record of no accidents. Since 1922, 118 cement plants have won the trophy and a grand total of 351 plant years have been worked without a single disabling injury.

Mr. LeGore credited much of the success of the safety contests and campaigns to the fact that the individual employe is enlisted in the battle to stop accidents and help win honors for his plant and at some time or other serves as a member of his plant's safety committee.

The second decade of consistent progress in cement safety, from 1923 through 1932, saw the frequency of disabling injuries and fatalities reduced 89% to the all-time low of 4.5 per million man-hours in 1932. For that ten-year period the severity of injuries was reduced to the low mark of 1.8.

Mr. LeGore pointed out that the

four unsettled years from 1932 through 1936 saw an upward trend in frequency and severity of disabling accidents, but with a sharp reversal in the right direction in 1937.

Upon analyzing the 1936 record, it was disclosed that three departments, quarry, raw and burning, working slightly more than a third of the total man-hours operated by the industry, were responsible for fully one-half of all accidents reported and 53% of all actual time lost because of injuries. And 75% of the fatalities for the year occurred in these three departments.

Another startling fact pointed out in individual injury reports for 1936 was that one-fourth of the cement workers who were hurt had not been in the employ of their plants one year before the injury occurred. Only five percent of the total employes in the industry were in this group, pointing out the need for better training and more effective supervision of workers in the industry.

Accident Trends

Mr. LeGore, in reviewing the trend of accidents in the cement industry for 1937, said that the total number of accidents for the first eight months of this year is 22.5% lower than the figure for the corresponding period in 1936, but with 11 deaths as compared to 12.

The three problem departments, quarry, raw and burning, have contributed 39% of the accidents reported to the Portland Cement Association during the first eight months of 1937 with six of the 11 fatalities occurring in these departments. Credit is given mainly to the raw department which has reported about seven percent of the disabling injuries and fatalities so far this year compared with 12% last year. But more than one-third of all accidents occurring in this department have resulted fatally.

The quarries have experienced 19 percent of all injuries and fatalities reported during the eight months compared with 21% of the 1936 total. Burning departments have been responsible for 13% of all accidents compared with 17% last year.

The greatest increase in percent of total injuries this year over last has been in connection with plant railroads outside the quarry, indicating need for prompt regulation and enforcement of safe working practices among trainmen.

Mr. LeGore's report showed the imperative need for training the new worker to do his work safely. The 1937 record for eight months shows that one-fourth of the cement workers who were hurt had not been in the employ of their plants one year before the injury occurred, this group making up only one-twentieth of the total employes in the industry.

He emphasized the importance of the development of safe methods of performing operations, which must be done by careful training and teaching, not just telling, and the value of careful follow-up by supervisors to make sure that the worker thoroughly understands his work and what he is and is not to do in connection with it in order to keep safe.

Falls, falling and sliding cement and other objects, hand tools in the hands of the injured, flying or moving cement

Fred B. Hunt

and other objects, electrical equipment and improper piling and handling of objects are the leading causes of disabling injuries in 1937.

Fractures and severe cuts, burns and bruises dominate the injuries tabulation, showing why the severity rate of the cement industry is usually so much higher than its frequency rate and the experience of other industries which report accident experience to the National Safety Council indicate it should be.

Silicosis

About 1,000,000 persons, or approximately 2% of the workers in the United States, are exposed to the hazards of silicosis, according to R. Campbell Starr, assistant safety engineer of the U. S. Department of Labor, who reported on the work of the National Silicosis Conference in an address on Wednesday before the quarry and cement section of the National Safety Congress.

"Silicosis is strictly an occupational disease," Mr. Starr declared. "Medical science has not reported silica dust as affecting any individuals except those who, over a relatively long period of time, have worked in an atmosphere where the air they breathed contained excessive concentrations of free silica. The disease causes normal lung tissue to be replaced by fibrous or scar tissue.

"Full realization of the significance of the disease and its occurrence among various industries took place rather suddenly about 1932-33. This realization was manifested by a flood of claims in states providing workmen's compensation for silicosis and similar dust diseases and the large number of common law actions in states not compensating for the disease."

The depression was blamed, in part, for many of the claims, Mr. Starr said. The effect of the silicosis "scare" was heightened by the lack of experience figures and the activities of less ethical lawyers and physicians.

As a result of the "scare," the speaker related, the secretary of labor called a conference in Washington on February 26, 1936, of about 75 men, representing leaders in the industries having a silicosis problem, labor leaders and outstanding representatives of the medical, legal and engineering professions, as well as insurance carriers and state administrators.

Four committees named as an outgrowth of the conference included one on prevention through medical control, one on prevention through engineering control, one on the economic, legal and insurance phases, and one on regulatory and administrative phases of the silicosis problem.

A fifth group, known as the correlating committee, was set up under the chairmanship of W. H. Cameron, managing director of the National Safety Council. First reports of the committees were made to the Secretary of Labor at a second national conference on February 3, 1937, and a summary of the reports was published by the division of labor standards. The complete reports are being edited and will be published soon.

"Silicosis can be prevented in three general ways," Mr. Starr asserted. "First, by preventing the creation of silica dust; second, by preventing the dispersion of dust into the atmosphere of a working area; and third, if it is impossible to apply the first two methods, by the use of personal protective equipment such as respirators, to prevent the inhalation of the dust.

"While the primary approach to the

problem must be the prevention and diminution of the hazard, the fact must be recognized that until silicosis has been wiped out, workers who now have the disease, as well as those who may contract it, must receive workmen's compensation just as do those workers who are injured in accidents."

Questions and Answers

The closing subject on the Wednesday program was a roundtable discussion directed through the medium of a list of questions carefully prepared by Program Chairman A. B. Sunderland. The questions are of so much interest and value to quarrymen that they are given in full, with a digest of the more important discussion which followed each question.

1. *What regular safe practices should be established to prevent injuries to workers on the quarry face from falling, sliding rock?* (a) Should each driller be required to bar down all loose rock and otherwise prepare his own work field so that he may work in safety, or should there be experienced scalers to do nothing else? Quite a marked difference of opinion was noticeable in the discussion of this question. Many of those who spoke from experience with the larger operations, where it is always possible to employ experienced scalers as well as drillers, preferred to have the scaling done by specialists, although others inclined to the practice of having each driller do his own scaling so that he might know with certainty, that it had been properly attended to. (b) How often should barring down of rock be done? Consensus of opinion was that it should be done as promptly as possible in every case, and never delayed. (c) What equipment is needed for scalers and how should it be used? Scalers should always be equipped with life belts and ropes. (d) Should drillers wear safety belts and rope while drilling? This depends on local circumstances. Under some conditions a rope may impede a man in getting out of the way of rock. (e) Should scalers or drillers work alone, or should they have helpers to handle ropes and watch for first signs of an unsuspected slide so as to warn their partners? Scalers and drillers may work alone on relatively low faces, but it is customary in most places, and safer to have them work in pairs.

2. *What is the best method of protecting workers during "block hole" or "dobie" shooting?* (a) Should a portable shelter be used? If so, what type, and where should it be placed? Portable shelters should always be used. The commonest type is made of old kiln or dryer sections fitted with steel caps or roofs. Men should be warned not to lean against sides. (b) Where 25 or 30 fuses must be lighted and the powderman securely sheltered before charges fire, is not timed rehearsal essential to determine safest, quickest path between fuses and between fuse lighted last and shelter, as well as use of the timer or warning fuse? Yes, by all means. Some advocated that all secondary shooting be done by electric exploder. In such case current should be brought in on a line used only for this purpose, switches kept locked, and all firing done by the foreman. The electric line should be frequently and carefully tested, particularly to make sure that ample voltage is available. (c) What is proper waiting period before investigating apparent failure of secondary blast? At least one hour should elapse.

3. *What signals and safety rules are essential to the safe operation of quarry railroad?* (a) Who should ride quarry trains? Absolutely no one should be permitted to ride quarry cars at any time. Most plants permit employees to ride in engine cab in line of duty. One company allows no one except the motorman in its Diesel cabs. (b) What about grade-crossing protection? One company reported installing standard railroad flasher signals at all of its road crossings. Others maintain flagmen during working hours.

4. *How should high-voltage portable power cables to electric shovels be handled to prevent shock, and how should they be protected against cuts and bruises?* (a) Who should handle cables, and should they be handled with power on? Insulated poles and hooks should be used, either of wood or of metal and rubber construction. Rubber gloves and rubber boots are also wise precautions and the latter must always be worn in damp weather. Ordinary cable should be supported on tripods about 6 ft. high with 8-ft. tripods at crossings. Several operators highly recommended the use of armor-grounded cable of a type which has a screen of grounded wire surrounding each conductor. Such cable may be allowed to rest on the ground. (b) What precautions should be taken in using shovel circuit to fire explosives? It is best not to use the shovel circuit for firing. A separate line should be installed for the latter purpose.

5. *How may dynamite sickness be prevented?* Inexperienced men should wear rubber gloves when handling dynamite. It is a good precaution to wrap dynamite in three or four thicknesses of waxed paper.

6. *How may slipping hazards in the quarry be minimized during icy weather?* By using "creepers" on shoes—gunny sacks also may be used.

"Let's Go into this Accident"

The next feature of the program was the presentation of a safety skit, showing an ideal investigation of an accident which happened a few months ago in one of the mills. The scenerio was written by W. W. Deadman, superintendent and J. A. Fairchild, chief chemist of the Lone Star Cement Co. at Bonner Springs, Kan. The following members of Mr. Deadman's staff took part: J. H. Griffith as superintendent, E. R. Willis as safety director, C. E. Smith as general mill foreman, C. Wasson as shift foreman and A. W. Ballentine as the injured man.

(*Continued on page 67*)

Booth of the Macwhyte Co., Kenosha, Wis., exhibiting various types of braided wire rope slings

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Illinois Mineral Industries Meeting Develops

FACTS That HELP BUSINESS

By NATHAN C. ROCKWOOD

UNDER the able leadership of Dr. M. M. Leighton, State Geologist of Illinois, each year a widening group of men interested in the development of the mineral industries is brought together to hear about new developments in the state. As editor of ROCK PRODUCTS I have been a member of Dr. Leighton's Mineral Industries Committee from its inception, ten or a dozen years ago, and a contributor to its transactions. Each year more and more producers have become enough interested to attend, and once they have attended they usually become converts.

Dr. Leighton has a considerable and a very active research staff; and the primary purpose of these annual meetings appears to be to bring these men into personal contact with the business men of the state who are in the mineral industries, and to give the business men the latest reports on research in these mineral industries. Both parties get inspiration and stimulation through these contacts; Dr. Leighton has promoted something that other state geologists could well copy.

The sessions are divided up into group meetings on (1) coal; (2) oil and gas; (3) clay and clay products; (4) rock and rock products. The recent meeting at Urbana, Ill., October 8 and 9, dealt with rock and rock products as follows:

Rock and Rock Products

With E. J. Krause, president of the Columbia Quarry Co., St. Louis, Mo., and president of the Midwest Agricultural Limestone Institute, presiding, the first subject discussed was by another "charter member" of the Mineral Industries Committee, W. R. Sanborn, president of the Lehigh Stone Co., Kankakee, Ill. His subject was "The Production and Possibilities for Limestone Rubble and Ashlar for Construction," a development of his own limestone rubble and ashlar.

Rubble Stone

As in many other limestone localities, quarries in Kankakee and other Illinois towns were opened originally to supply ashlar, or roughly squared building stone. With the intensive road-building era they became, almost without exception, operations to produce crushed stone exclusively. The road building era over, temporarily at least, quarry owners were hard pressed to find an outlet.

Mr. Sanborn's quarry has some strata that yield limestone of pleasing shades of color, and so grained that it is readily split into rectangular sizes 4 in. thick, by the old-fashioned plug-and-feather method. These blocks are sold for building purposes—homes and public buildings—in competition with brick and Indiana limestone, to owners and architects who appreciate the individuality possible with such a material.

Mr. Sanborn's success has been largely due to adapting his product to modern needs for veneer finishes, instead of solid wall construction for which stone masonry was once much used. He also employed a sales specialist to promote it. He told his audience that this end of his business was not profitable yet, but that it had possibilities.

Stone Research

J. E. Lamar, geologist and head of the non-fuels division of the Illinois Geological Survey, reported on "current researches on Illinois stone and their relation to developments in the stone industry." Dr. Lamar began by explaining the relation of the survey to this research work—its justification—which he showed was for the benefit of the consumer in seeking better and cheaper materials, and for the benefit of the producer in the maintenance and development of his markets. Naturally, of course, the state must do broad scale research rather than that type of research which benefits but one or a few operators.

That broad scale research includes cataloging the stone resources of the state. Thousands of samples have been taken from all exposures in the state and a tremendous amount of detailed information is being accumulated and digested and summarized, so that different horizons (outcrops of the same geological era) may be recognized and properties of the stone predicted. Many deposits, such as the dolomites in the Chicago area, which have been assumed to be of fairly uniform composition and qualities, have thus been found in

Left: Quarrying rubble stone by the "plug and feather" method at the plant of the Lehigh Stone Co. Center: Fine example of architecture using a rubble stone veneer finish. Right: Cutting the rubble veneer

four or five differing varieties. This information was developed in a search for weather-resisting dolomites suitable for use in Chicago sewage filters.

Incidentally, this research has involved the relation of soundness tests by the sodium sulphate and freezing and thawing methods to actual weather resistance. Incidentally too, this research, identified as it is with a broad scale geological research program, yields data from which conclusions may be drawn as to why some dolomites are weather-resistant or sound, and others not. Similarly, the way is opened for the accumulation of a vast fund of useful information, which producers can learn to use to good advantage.

Dr. Lamar also touched briefly on the possibilities of developing more knowledge of the nature and properties of the silicate melts—CaO-SiO_2-Al_2O_3-MgO. These, in various combinations, make glasses, of which rock wool is one. By varying the proportions of the ingredients and the heat and pressure in melting, it is obvious that glasses with various properties can be produced.

Agricultural Limestone

Dr. E. E. De Turk, professor of soil fertility, University of Illinois, described "progress in the knowledge of Illinois soils and its relation to their need for agstone," in an interesting and unusual way. Explaining the fundamentals which underlie the efficient use of limestone in agriculture, he said the soils of Illinois are glacial debris, originally calcareous, but their lime content has been and is being leached out. These soils remain neutral or slightly alkaline because of their clay content, clay having what is called a base exchange relationship or the property of absorbing other minerals. In other words, the minute lime particles will stay attached to the clay until displaced by an acid particle. Such acids are introduced into the soil by rainwater. With weathering, soils lose their fine clay content and hence their base exchange capacity. This means that the lime requirements vary greatly even within the bounds of a 40-acre field—from a requirement of zero to 3 or 4 tons per acre—to make these soils neutral, or alkaline.

Dr. De Turk then discussed the time element in changing the soil from acid to neutral, showing how this is affected by the size of the limestone particle or the fineness of grinding. The neutralizing effect of a particle of limestone in an acid soil does not extend beyond ½ in., and it takes three or four years of favorable conditions for this reaction, so that the finer the size, the more surface of limestone exposed to soil action. For example, there are 64,000 of 100-mesh size in a ¼-in. cube; it would take 100 such cubes to provide approximately the same neutralizing effect as one cube reduced to 100-mesh material. On such a basis the agricultural value of various limestones are rated on Tyler screen gradations as follows:

100-mesh	material	X	1.15
48-100- "	"	X	1.05
28-48- "	"	X	1.00
14-28- "	"	X	.95
8-14- "	"	X	.80
4-8- "	"	X	.33
over 4- "	"	X	.00

The average rating of Illinois agricultural limestones on this basis has increased from 75 to 84 in the last few years. In other words there is a tendency to market finer ground materials.

Since dolomite is less soluble than high calcium limestone it is necessary that it be finer ground. In the finer sizes, Dr. De Turk said there was little difference in results between the two. How fine to grind is purely a matter of farm economy, he said, for he insists the farmers must have a low priced product.

As to the available market, Dr. De Turk said 15 million acres in Illinois need an average of 2 tons per acre right now. About 1,000,000 tons is being used annually, and this is not enough to keep up with the loss of calcium annually.

Road Gravel and Stone

Ernst Lieberman, chief highway engineer, Illinois State Highway Department, submitted a paper, read by E. J. Fleming, of his department, on "current developments in stabilized gravel and crushed stone roads." This type of highway improvement has become important in Illinois and other farm states where many miles of road off the main lines need surfacing. Mr. Lieberman presented a chart which showed the limits of gradation of aggregates, based on state highway engineers' experience. The object of all such mixtures or blends is to achieve maximum density in the cheapest way. Some 10 to 12 percent of the right kind of clay is the most important ingredient. Both calcium chloride and sodium chloride (common salt) are used to retain moisture in the mixture, the moisture supplying the actual binding medium. Crushed stone dust has been used satisfactorily in place of clay.

Mr. Lieberman said that his experience with this type of road was satisfactory and that it had a place in the highway program. He thought there was lots of opportunity to improve technique both on the mixed-in-place job and the plant-mixed job. The chief and only virtue of this type of road being its cheapness, it was evident that such improvements in technique must not raise the cost. He recommended the Pioneer Gravel Equipment Co.'s portable plant as the most satisfactory yet discovered for mixing the aggregates.

The amount of aggregates required were given as follows: 2370 cu. yd. per mile for a 20-ft. wide surface; 2151 cu. yd. for a 18-ft. surface. Mr. Lieberman said the state was surfacing 500 to 600 miles a year with this type of material.

The second day's sessions included clay and clay products along with rock and rock products and dealt largely with methods of exploration, investigation and research. The chairman was S. A. Phillips, editor of *Pit and Quarry*.

Little Known Resources

J. E. Lamar, Illinois Geological Survey, read a paper on the unexploited or little known minerals of the state, mentioning small deposits of green sand, a potash-carrying mineral, found in connection with the St. Peter sandstones of the Ottawa district, and the la ge beds of peat in the northern counties of the state. He told of the characteristics of the Ottawa sands and their special uses. He also described slate and brine resources, which are not considerable and are not yet commercially developed.

He mentioned one rock which few know exists in Illinois—gypsum. There are beds of it in the southwestern part of the state, known from well-drill records, but most of them are too far below the surface to be of commercial significance at this time.

Some of the Illinois limestones carry resins or bitumens that it may be feasible to recover at some future time. There are also some sandstones nearly approaching quartz, and many colored sands and clays that may have some commercial significance because of their color.

Geophysical Prospecting

H. A. Buehler, state geologist of Missouri, very interestingly described the use of geophysical apparatus for locating magnetite and other mineral ore bodies by systematic subsurface surveys. The methods are now well-known, having been used even in the sand and gravel industry, as described in ROCK PRODUCTS and elsewhere. Dr. Buehler's contribution was of particular interest and value to geologists in showing how geophysical apparatus can

greatly extend the knowledge of subsurface conditions, hitherto known only from surface outcrops, mines and wells.

Magnetic Separators

J. J. Ferris, chief engineer, Dings Magnetic Separator Co., Milwaukee, Wis., described actual and possible applications of magnetic separators to some of the problems of separating and purifying common minerals. Great progress is being made in this field in both magnetic and electrostatic devices, and all who have problems of that nature in the rock products industry should learn all they can of the work being done.

Mr. Ferris sketched the development of magnetic separators from their early use to remove tramp iron, etc., to the freeing of silica sand and fluorspar from all iron compounds that are susceptible of magnetic attraction. The invention and improvement of the high intensity magnetic separator has greatly extended the possibilities of minerals separation, but the costs are still too high for wide application to most rock products.

Bleaching Minerals

Color is a detriment in the commercial use of some minerals, just as it is an advantage in others. Dr. J. S. Machin, chemist, geochemical section, Illinois State Geological Survey, described possibilities of bleaching out the color of some of these non-carbonate minerals. The five methods described were (1) burning them out at high temperatures; (2) leaching with acids alone—usually sulphuric and hydrochloric acids—; (3) leaching with acids in the presence of reducing agents; (4) electrical methods; (5) magnetic separation. He has proved that undesirable impurities can be leached out with acids, but the process is not yet commercial. Silica, for example, can be purified in this way, but as yet it is not economically feasible.

Conclusions

The report given is rather sketchy because it was not considered necessary to go into detail about processes and theories which have yet to be applied commercially in the rock products industry. However, every producer should aim to keep abreast of the *nature* of the work done by the Illinois Geological Survey and of their own state surveys and experiment stations. Frequently operators will thus get some clew to a long unsolved and bothersome problem.

GRAY CONCRETE CO., Hagerstown, Md., reported a loss of $25,000 when a fire damaged its Bridgeport plant.

Safety Congress

(*Continued from page 64*)

"Let's Go Into This Accident" proved so highly instructive and intensely interesting that it was recommended at once for use at safety mass meetings in all of the mills.

The Value of Safety Training

F. M. Pepper, general plant employment supervisor of the Illinois Bell Telephone Co. presented a very complete paper entitled: "Is Training a Vital Factor in Effective Safety Work?" Mr. Pepper showed the inevitable necessity for supervisor and vocational training if safety work is to become fully effective and described the care with which his company had researched the subject and is proceeding to provide training.

Promoting Safety in the Aggregates Industries

In the Thursday afternoon joint meeting, H. A. Koop, Lyman-Richey Sand and Gravel Corp., Omaha, Nebr., spoke on "Methods Used to Win the National Safety Award." This concern, operating 22 scattered plants in Nebraska, at one time had such a high accident frequency rate, that insurance companies refused to continue insurance.

Each plant was supposed to establish its own safety rules and conduct its own campaign, originally, but when records revealed the discouraging figures of 79 lost-time accidents in 163,275 man-hours of exposure another plan was adopted.

First of all, a veteran employe was appointed full time safety director. Employees were required to pass physical examinations, every possible accident hazard in and around machinery and equipment was removed; meetings of foremen were held to discuss safety conditions and plan the campaign; trophies and cash bonuses were awarded to foremen whose plants had the best safety record; first aid kits were provided and bulletin boards and posters were used to further educate workmen in safety habits.

"Slowly but surely," Mr. Koop said, "we are making progress toward our goal of a no-lost-time-accident record for all our plants. Considering the decreasing number of accidents reported with the increasing efficiency in operations, we come to but one conclusion: Safety does pay."

Speaking on the same subject, A. W. Heitman, assistant general superintendent, Inland Lime and Stone Co., Manistique, Mich., a plant producing several million tons of stone annually and employing upwards of 300 men, emphasized the importance of thorough safety education. Bi-weekly meetings are held for all employes, when safe practices are demonstrated and a safety engineer makes regular inspections at this plant.

A continuous health record is kept for each employe and annual physical examinations have been employed to raise the health standards. The accident record was far from satisfactory at this plant until a definite procedure was adopted.

Sixteen lost-time accidents with an exposure of 350,680 man-hours was the plant record in 1931. In 1933, with an improved accident prevention program, the plant operated without lost time accidents and for that year and 1934 received the safety award given by *Explosives Engineer*.

Posters

Earl Spitzer, safety engineer, Columbia Steel Co., Pittsburgh, Calif., instructed those in attendance to make "Stickmen Axigraphs" to be posted on bulletin boards, illustrating how an accident occurs. Mr. Spitzer's sketches quite simply illustrate what happened before, at the time and after a particular accident, and have been used successfully by his company.

At the election of officers of the Quarry Section, it was decided that the 1937 officers be authorized to continue pending consideration of a plan to merge the Quarry and Cement Sections.

Officers of the quarry section are as follows: General chairman, Alexander Foster, Jr., Warner Co., Philadelphia, Penn.; vice-chairman, Russell Rarey, The Merbla Cliff Quarries Co., Columbus, Ohio; secretary and news letter editor, N. B. Sipe, J. E. Baker Co., York, Penn.; chairman, poster committee, H. F. Yotter, General Crushed Stone Co., Easton, Penn.; chairman, publicity committee, J. R. Boyd, National Crushed Stone Association, Washington, D. C.; chairman, statistics committee, W. W. Adams, U. S. Bureau of Mines, Washington, D. C.

V. P. Ahearn, National Sand and Gravel Association, Washington, D. C.; William H. Baker, J. E. Baker Co., York, Penn.; O. M. Graves, General Crushed Stone Co., Easton, Penn.; Walter Stauffer, National Lime Association, Washington, D. C.; and A. L. Worthen, New Haven Trap Rock Co., New Haven, Conn., are members at large of the executive committee.

The exposition included practically every imaginable device that could be used to promote safe working conditions. Among the exhibits were many displaying dust collection devices and respirators, safety shoes and clothing, safety machines and tools, cable slings, etc.

Chemists' Corner

Some Interesting Investigations Into the

ROLE OF SILICA IN PORTLAND CEMENT

By DR. GABRIEL A. ASHKENAZI

Consulting Chemist, New York City

SINCE WE KNOW THAT "silica in a portland cement forms with lime the essential cementing compounds" an abundant work about cement hinges on silica. In spite of all that, the results still are not complete.

This is the general condition in silicate chemistry, and the cement industry shares in this respect the fate of the industry of glass and ceramics.

Reasons for imperfections of research are due to the specific chemical, and physical properties of silica and silicates. Each investigation is connected with extraordinary difficulties. The silicates, as a rule, can not be dissolved, without being decomposed. Synthesis of the silica compounds requires very high temperature, the complex nature of the silica compounds and their high melting point, combined with high viscosity, making the reactions very slow. The low rapidity of reaction results in the fact that only in rare cases can a constant equilibrium be reached. Anomalies of glass are well known. W. Eitel in his "Physical Chemistry of the Silicates" cites many examples of such anomalies. The difference in the qualities of a glass is sometimes independent of its chemical composition, and glasses of the same chemical composition show different propertics, subject to the configuration of the established equilibrium.

The mentioned difficulties of investigation explain why chemists who were not directly connected with the silicate industry generally evinced little disposition to work out the experimentally complicated subject. Still, in several countries special institutes for research of silicates were created. In Germany, The Kaiser Wilhelm Society for Furtherance of Science established the well known Institute for Silica Research. The systematic and famous investigations of The Geophysical Laboratory of Carnegie Institution of Washington created foundations for a better understanding of the reaction between silica and metallic oxides into state of fusion.

Silica is a dioxide of Silicon. We know that besides Silicon of an atomic weight of 28, there exist two isotrops Si_{29} and Si_{30}. The investigation of R. S. Mulleken and F. W. Aston[2] showed that the element Silicon is composed chiefly of Si_{28}. The two other isotrops accompany it in very little quantities. Research of F. M. Jaeger and D. W. Dykstra[3], who separated Si from a great number of different silica minerals of sedimentary, volcanic, and metamorphic origin, proved that the proportions of the isotrops in terrestrial as well as in the meteoric Silicon are equal. Therefore, we can surely admit that all the silica compounds are composed of one kind of SiO_2.

Silica Hydrogel and Cement Hardening

Since J. M. Van Bemmelen published his investigations, we know that silica forms with water, colloidal gel, composed of $SiO_2 + H_2O$ in variable proportions. Van Bemmelen[4] found that the constitution of silica hydrogel precipitated from the colloidal solution depends on the concentration of the solution. Thus, the solution of 7 percent of silica in water gives a hydrogel composed of one mol. SiO_2 and 35 mol. of H_2O; a 1 percent solution gives a hydrogel consisting of one mol. SiO_2 and 331 mol. H_2O. It is admitted that silica and water form the silicic acid, but it is not exactly known whether a silicic acid of a definite composition exists. Nevertheless, we consider the compounds of silica and bases as salts of a silicic acid of a composition as (H_2SiO_3), or (H_4SiO_4). Some of the investigators, like Dr. L. Forsen, deduce the silicate of calcium from the hypothetical silicic acid: H_6SiO_5. Whether silica forms with water an acid of a definite composition, or not, it is known that they form hydrogel. As W. Michaelis, Jr.[5] proved, these hydrogels after being dried by means of water absorbent agents, and then compressed into a cake, show a remarkable resistance. Tested for compressive strength, silica hydrates gave resistances which fluctuate between 1097 and 11687 lb. per sq. in., depending on the amount of water remaining imbibited in the hydrogel. It is the chemically precipitated silica which swells and gives colloidal hydrogel. Quartz and ignited silica hydrogel are inert and can not be converted into gel. W. Michaelis Sr.'s statement that quartz, being reduced by prolonged grinding to an impalpable powder, becomes active and forms colloidal gel could not be confirmed. However, we find in the literature[6] that dried silica hydrate, tridimit and some of the silicates containing active silica, being ground to infinitesimal powder and then treated with a solution of 166 mg. of Ca $(OH)_2$ in 1 liter of water show a tendency to swell. The greatest swelling was found by trass and pumice.

Characteristics of silica to swell induced W. Michaelis, Sr. to advance his gel theory to explain the setting and hardening process of cement. It was a daring enterprise to find a prototype of the hardening of cement in the solidification of gelatine. Consequently his opinion met severe criticism. At that time all cement experts were partisans of the Le Chatelier[1] crystallization theory of hardening. But, in spite of this criticism and of the established defects of Michaelis' theory, his conception in somewhat modified form has many adherents. The greater number of investigators consider the process of setting and hardening as a result of crystal and colloid formations, De facto, it is im-

possible to draw a definite conclusion from the hundreds of investigations. The divergence of opinions is so great that one has to assume that the behavior of different brands of portland cement is different, depending upon the properties and nature of compounds. The already mentioned difficulties regarding the investigation of the silicates are working against the physico-chemical methods of research, and, as W. Eitel[7], Director of The Kaiser Wilhelm Institute for Silicate Research, pointed out, "especially, the processes of crystalization and hydration are easily deformed by a non-equilibrium." Whether the crystal, or the colloid formations, or the combination of both determines the mechanism of hardening of cement, this process is due to the hydration of silica compounds. The other ingredients of portland cement are playing a secondary role, promoting, or accelerating the mechanism of setting.

Silica Is Dominant Factor

Among the four principal oxides which form the skeleton of the heterogeneous system of cement clinker, the dioxide of silicon is the most important one. The writer's experience convinced him that the right proportion of silica in the raw mixture presents the most *dominant factor* in producing portland cement of "the highest quality in all its properties." Under the conditions of the commercial production of cement one can not generalize the correct proportion of silica, but the amount of it, can be and must be exactly fixed for each individual case. While the amount of CaO in the raw mix, in the majority of cases, can vary in relatively large ranges, without affecting the properties of cement, especially its strength; a little alteration in the proportion of silica changes considerably the properties of cement. This opinion based on writer's experience, may appear for many as an opinion with insufficient basis. Unfortunately, he can not publish all the facts from his industrial practice, but one example can be given.

A raw meal of a certain composition, estimated as the most suitable one for the given raw materials, was burned in a laboratory kiln and a well sintered clinker was obtained. The chemical analysis gave results as follows:

CaO: 65.26%, MgO: 1.31% Al_2O_3: 6.00%, Fe_2O_3: 3.05%, Alkalies: 0.78, SiO_2: 21.92%, Ignit. loss: 0.47%, Insoluble: none, Free CaO: none, SO_3: 0.21%.

The clinker after being ground with 3 percent of gypsum to a fineness of 1 percent residue on the sieve of 5000 meshes per square centimeter was tested for tensile strength. The briquettes were prepared according to British Standard Specification of a mortar of one part of cement and three parts of British Standard sand and 8 percent of mixing water. The results after 1, 3, and 28 days (an average of 6) were: 360, 504, and 642 lb. per sq. in.

From the same raw meal, eight samples were prepared: No. 1-4 by intimate mixing with 0.2, 0.4, 0.8 and 1.2 percent of chemically precipitated, ignited and powdered SiO_2, and No. 5-8 by adding in the same way of 0.4, 0.8, 1.6 and 2.4 percent of pure CaO which was slaked, before being intimately mixed. The samples were burned under the same conditions as the normal raw meal, the clinker produced was ground with 3 percent of gypsum to the above mentioned fineness and tested for tensile strength as above. The average results were as follows:

Lb. per sq. in.

No.:	1	2	3	4	5	6	7	8
1 day	364	304	245	171	375	401	375	370
3 days	498	422	382	286	510	500	508	451
28 days	607	531	472	400	600	587	610	485

Results show that an increase of 0.4 percent of silica in the raw meal decreased considerably the strength of clinker, while an increase of 1.6 percent of lime did not affect its strength.

The increase of lime content resulted in producing a more porous clinker; samples No. 7 and 8 showed the presence of 0.55 percent, and 1.3 percent, respectively of "free lime," a more quick setting time, and an increase of the heat of hydration. But with the exception of sample No. 8, the cements with increased lime content did comply with the requirements in regard to a high grade portland cement. The increase of silica content in the raw meal of 0.2 percent (sample No. 1) resulted in producing of a more vitreous clinker, the other properties remained nearly unchanged. The chemical analysis, apart from alteration in content of oxides, corresponding to the change in the composition of raw meal, showed nothing particular. Other samples of augmented content of silica resulted in a partly discolored clinker tending to "crumble," whereby the inclination to crumble grew parallel to the increasing amount of silica. The process of setting became irregular, with interruptions, retarding the final setting. Sample No. 2 showed the presence of 0.4 percent of insoluble, sample No. 3, 0.85 percent; and sample No. 4, 2 percent of insoluble and 0.7 percent of "free lime."

From the above mentioned facts we see that a correctly prepared raw meal could digest an additional amount of 1.6 percent CaO without an unfavorable effect in regard to the strength of the clinker produced, while the addition of only 0.4 percent of SiO_2 reduced considerably the strengths and changed significantly the other properties of the clinker produced. Considering the carefulness in respect to mixing, adjusting, briquetting and burning, which took place during this experiment, we must assume that an alteration of less than 0.4 percent under the conditions of commercial production, can bring forth the most undesirable results.

Other tests regarding the strengths, namely, tests for bending and crushing, executed on prisms made of plastic mortar (1:3, with 10.5 percent of mixing water) showed a picture similar to the tests for tensile strength.

High "Silicate Modulus" Desirable

The cement manufacturer considers the four principal oxides which form the major compounds of clinker in terms of ratios. The so-called "lime ratio" or "hydraulic modulus" gives the actual basicity of the cement and its limits are fixed in the standard specifications of different countries. The standard specification of this country does not include this term. Nevertheless we are accustomed to use it. Modern cement chemistry substitutes it by a more definite term, so-called "lime saturation point." Regarding the proportion of silica in portland cement, we have no similar regulations. The industrial technique, however, advanced some practical rules. Raw meal of a high content of silica is difficult to burn and the cements produced have a slow set and slow hardening, but are more resistant to aggressive solutions. The relationship between the amount of silica and the sum of alumina and iron oxides also plays an important role. It was Prof. H. Kuehl who introduced this factor, under the name of "silicate modulus." According to Kuehl[8] the highest strengths will be obtained from cement of a very high silicate modulus, ranging from 3 to 4, or of a very low one. The practice and the examination of a great number of high strength cements show rather a middle silicate modulus. This is easy to understand considering how hard it is to sinter a raw mix of a silicate modulus equal to 3 or 4, and how annoying it is to burn a raw meal of a low silicate modulus inclined to cake and to form rings in the kilns.

It has been shown that even a little addition of silica to the raw materials changes considerably the properties of clinker. The addition of silica to the clinker can in many cases influence the

qualities of the obtained mixed cements. Of course, the amount of silica added should be larger and the silica must occur in so called "soluble" (reactive) form. The addition by means of intimate mixing, or intergrinding of soluble silica-containing materials, such as trass, spent shale, diatomaceous earth, etc., in proportions more than 10 percent should improve the strength and hardening properties of cement. The use of such blended cements, known under the name of "pozzolanic," is relatively small in Europe*, still less in this country. In recent years it has become more extended, especially for hydraulic constructions and mass construction work, instead of "low heat cement." For example, Sweden, since 1934 has produced on a commercial basis a low heat pozzolanic portland cement. In this country pozzolanic cements were used for a part of the construction of the Golden Gate Bridge and San Francisco-Oakland Bay Bridge. It was also used for Bonneville Dam on Columbia River. In Japan it is used more extensively, the Japanese scientists having made extended investigations of its properties.

Pozzolanic Cement Investigations

Interesting results of investigation of pozzolanic cements were presented by Shoichoro Nagai[9] and others to the Institute of Silica Research, Tokio Imperial University in September, 1935. Cement clinker was mixed with natural siliceous earth, or with spent shale in the proportions of 60:40, or 50:50. The tests of various samples showed: (1) Strengths of mixed portland cements cured for 56 weeks in water are nearly equal to, or a little greater than, those of portland cement cured under the same conditions. (2) The rates of expansion, or contraction are nearly the same with mixed cements as with portland cement. (3) Mixed cements are incomparably more resistant to alkali sulfate solutions; regarding the resistance to 10 percent solution of $MgSO_4$ in water, the mixed, as well as the unmixed cements showed a poor behavior. In magnesium chloride solution the specimens made of portland cement mortar showed a *better* resistance than those made of mixed cements; a quite unexpected result. In a sodium chloride solution, the compressive strengths of mixed and straight portland cements are nearly equal.

There is some divergence of opinion about the pozzolanic cements, but in general, the following statement made by P. H. Bates[10] characterizes the conditions: "the pozzolanic cements have the outstanding properties of low early strength, but very steady gain in strength, and an excellent resistance to aggressive waters after they have acquired a certain part of their ultimate strength." In a paper presented by Raymond E. Davis to the 30th Annual Convention, American Concrete Institute, 1934, are given the results of systematic investigatigations of pozzolanic cements made by the Engineering Materials Laboratory of the University of California. The results show that the addition of pumicite to a cement of a "normal lime content" (55 percent C_3S) reduces its early strength in *greater proportion* than the ratio of added pumicite. Thus the replacement of cement content by mixing (not intergrinding) with 20 percent of pumicite, decreased the compressive strength of mortar; after three days, 44 percent; and after 28 days, 35 percent. Another experiment, when pumicite was interground in proportions of 20 and 30 percent, respectively, the compressive strength of standard mortar showed after seven days a decrease of about 33 percent in both cases; namely, 3680 lb. per sq. in. for the mortar made of straight cement, and 2370, and 2350 lb. per sq. in. respectively for the blended cements.[11] After one year the strength becomes "substantially equal," but a "long period of moist curing is necessary to develop the potential strength of a pumicite portland cement." Further, it was found that "the heat of hydration of a pumicite portland cement is less than for corresponding straight portland cement."

Explaining the action of pozzolanic materials on portland cement the paper states: "it is generally agreed that during the hydration of portland cement, free lime is formed as calcium hydroxide, which is soluble, and the majority of authorities agree that properly constituted siliceous material combines with the free lime released in the process of hydration, forming an insoluble cementing material."[12] The writer does not quite agree with this conception. Usually, pozzolanas react very slowly with hydrated lime at ordinary temperature. Many investigators admit, and we share this opinion, that during this reaction calcium hydrosilicates are formed. These compounds, however, are not stable. They are decomposed with the formation of gelatinous silica and calcium hydroxide. The cementing properties of pozzolanas-hydrated lime mixtures are due to the formation of this silica gel. Even, if we admit that the active or activated silica of pozzolanas react with the released calcium hydroxide of cement, the compounds formed are not stable and liberate again the intermediately bound calcium hydrate. Therefore, it is most improbable that the soluble calcium hydroxide of cement can be transformed into an insoluble compound. It is, however, most probable that the formation of additional colloidal silica from the intermediately formed, and then decomposed, calcium hydrosilicates augments the durability of pozzolanic cements in aggressive solutions. This would be in accordance with the established fact that cements of a high content of silica are more resistant to corrosive solutions. The particularly heavy decrease of early strength of pozzolanic cements, which does not correspond to the proportion of the admixed material, could be explained by the fact that the intermediately formed silica-calcium compounds violate the process of hardening. At long ages, during a long period of moist curing, these unstable compounds are decomposed and the disturbed process of hardening is restored.

Recently, at the International Congress of The International Association for Testing Materials, London, 1937, F. M. Lea[13] stated that "although lime mortar tests are of value when considering lime pozzolana mixes, they do not afford a satisfactory indication of the value of pozzolana for the use in mixtures with portland cement." This confirms the writer's experience that siliceous earth, containing a large amount of soluble silica, in some cases, did not improve, when added to cement clinker, its resistance to aggressive waters. On the other hand, the writer's experiments with blending of cement with sand, containing 98 percent of inert silica, gave quite satisfactory results regarding the bahavior in solutions of 1 percent sodium sulfate in water.

*Rem. We do not include the blast-furnace slag cements in the category of the pozzolanic cements. Many authors writing about the blended cements do this. This is not quite correct, inasmuch as the qualities of slag and pozzolanas are different. Whereas, blast-furnace slag possesses active hydraulic properties, those of pozzolanas have to be de-activated.

References:

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4) J. M. Van Bemmelen. Die Absorption. Dresden, 1910. p. 201.
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6) Ib. 1899. p. 64 and 1900. p. 166.
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9) *Cement and Cem. Manuf.* London. Febr. 1936. pp. 33-35.
10) Proc. A. S. T. M. vol. 33 (1933) ii. p. 466.
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13) *Cement and Cem. Manuf.* London. June, 1937. p. 170.

LIME PRODUCERS' FORUM

Conducted by Victor J. Azbe, Contributing Editor, St. Louis, Mo.

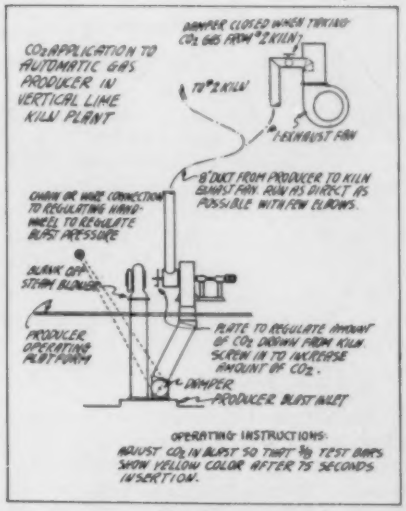
What Method of Blowing Gas Producers Will Be Used?

CO_2 – Air or Steam – Air

PROGRESS IN THE LIME INDUSTRY is slow but there are now many indications that definite advances are being made. Given another 10 or 20 years, lime plants will not be recognized as resembling those of today. This progress will be an improvement of many component items, some appearing of minor nature, but nevertheless important links.

One of these items in plants using producer gas is to determine whether a steam-air or CO_2—air mixture should be used for blowing producers. The writer recommended the use of CO_2 from the kilns in ROCK PRODUCTS, May 16, 1925 issue, and at that time and several times since has dealt with the matter in both its theoretical and practical aspects. It should hardly be necessary to cover the same ground again, but the fact remains that in plants where CO_2 was substituted for steam there was a considerable saving.

Plants that do not operate boilers to generate steam for producers, some of them not even having boilers, are: Moosehorn Lime Co., Manitoba; G. & W. H. Corson, Plymouth Meeting, Penn.; Kelley Island Lime & Transport Co., Buffalo, N. Y.; North American Cement Corp., Berkeley, W. Va.; and American Lime & Stone Co., Bellefonte, Penn. At least two others are now converting their plants to use this more desirable system; namely, the St. Genevieve Lime & Quarry Co., St. Genevieve, Mo., and Peerless White Lime Co., St. Genevieve, Mo. In one of these plants the cost of operating the boiler is $10,000 per year. In the other, the boiler, which also is needed for power, carries an additional load of 100 hp. on account of the producer. Kelley Island Lime & Transport Co., plant, Buffalo, N. Y., supplanted waste heat boilers with the CO_2 system, and thus greatly simplified plant operation. National Carbide Co. plant, built in 1929, never had a boiler, neither does the Corson plant.



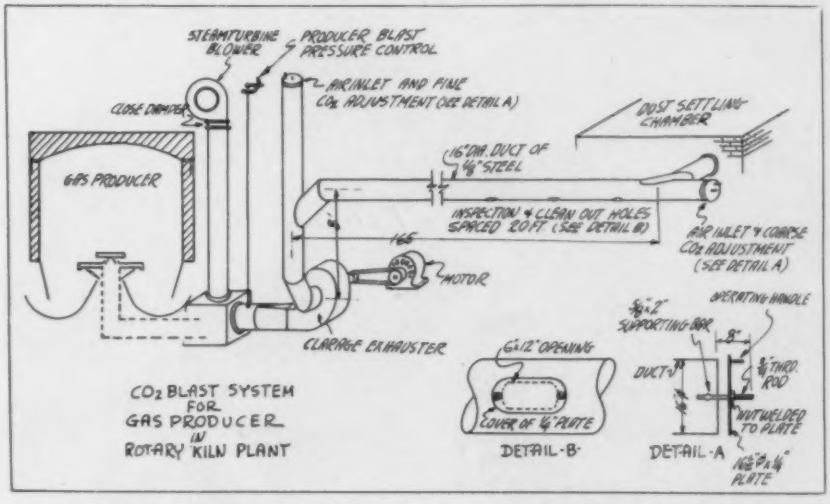
Vertical lime kiln installation showing how CO_2—air system is arranged for gas producer

Methods of Analyzing the Blast

In some cases, trouble is experienced in the initial operations of CO_2—air systems as they are inclined to give too much CO_2, cooling the hot zone too much, or they do not provide enough CO_2, causing formation of clinkers. With more experience, however, these troubles disappear. In certain plants the fireman analyzes the blast and maintains the CO_2 at a three percent level; in others they do not even bother with this test but judge whether there is sufficient CO_2 by the appearance of the $\frac{3}{8}$-in. test bars, which are left in the bed for exactly 75 seconds.

In the illustrations are shown two typical installations, one being in a rotary and the other in a vertical kiln plant.

Matters are rapidly shaping themselves so that in the future, aside from the mixed feed kilns, there will be only two types of lime plants: the rotary kiln, either fired with gas or pulverized fuel; and the vertical kiln, fired with natural gas or producer gas. Many of the hand-fired kilns will disappear in five years, and there will be virtually none left ten years from now. In view of this situation, more gas producers in lime plants will be seen in the immediate future.



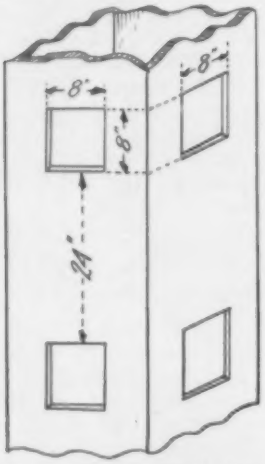
Installation details of CO_2 blast system for gas producer in a rotary kiln plant

HINTS AND HELPS FOR SUPERINTENDENTS

Eliminate Segregation In Bins

By E. M. GOULD,
Quarry Supt., Marquette Cement Manufacturing Co.,
Cape Girardeau, Mo.

ONE EFFECTIVE WAY to eliminate bin segregation of material is to make a square chute of four sides and leave an 8-in. square opening on all four sides every two feet, measured from the top of one opening to the bottom of the other opening. The length of the chute is the vertical distance between the bottom of the bin and the spout or conveyor discharging into the bin. The area of the chute should be sufficiently ample to carry the tonnage discharged into bin.



Section of chute designed to eliminate bin segregation

This chute is installed vertically from the bottom of the bin to the discharge spout. When the bin is empty the material will slide out of the bottom opening, and as the bin fills the material will slide out of the next upper opening. As the material will have a maximum two foot fall as it leaves the chute, the material gently slides out in a mass and eliminates any chance of segregation.

Apron or Spreader

AT A SAND AND GRAVEL PLANT in southern Wisconsin the dredge pipe discharges to an open hopper, from which the material is carried up to the plant by bucket elevators. The apron above the hopper receives the full force of the dredge discharge, and wear on it is considerable. An apron made of scrap

Improvised apron to resist wear from dredge pipeline discharge

railroad rail, laid as closely together as possible, and completely imbedded in concrete is used. The rails are laid crossways of the apron, and so receive most of the force of the discharge, but even so, the wear on the concrete between the rails is easily discernible. However, the apron has proved entirely satisfactory as the wear on the rails is negligible.

Keeps Complete Parts Assembly

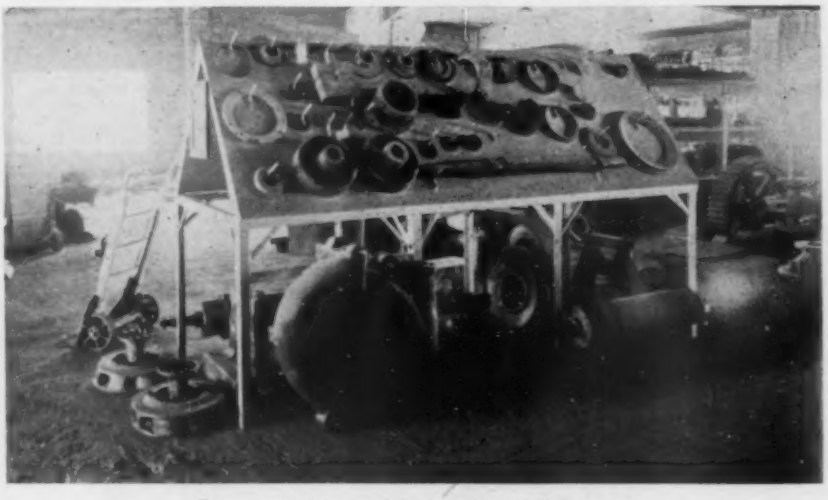
DEWEY PORTLAND CEMENT CO. is adopting a parts system in its new warehouse at the Davenport, Iowa, plant whereby a duplicate set of all parts for major equipment, even down to the bolts and washers, will be on hand at all times. In the event of a break-down or difficulty in securing parts in a hurry, due to strikes or other delaying influences in the plants furnishing the machinery, extra parts will be on hand. Every part for each machine is numbered and catalogued and has a definite location on a rack in the warehouse. As soon as a replacement part is needed, it may be found on the rack, and when it is removed from the rack a duplicate is ordered immediately.

Economical Rail-Truck Haulage System

FORT DODGE GYPSUM CO., Fort Dodge, Iowa, in getting out gypsum rock for direct car shipments and for delivery to the Fort Dodge Plaster Co., plant nearby, has a novel system for

Efficient and unique truck for hauling gypsum rock from bins to cars

hauling rock from the crusher bins that is very rapid and cheap to operate. The gypsum mine and crushing plant is on a bluff above the railroad siding and the plaster mill. Instead of building roadways for the truck haul to the track loading chute and the plaster



Spare parts for complete assembly of slurry pump

plant, a standard gauge track was placed under the plant bins extending to both points of dumping. Tires were removed from an old Chevrolet truck and regulation railroad wheels placed on the axles. The gears were reversed to give four speeds in reverse and two in high gear, the truck backing out from the bins and up a slight grade to dump. About 300 tons of crushed rock are handled in eight hours, using only one man. Four gallons of gasoline are consumed by the truck.

Hydraulic Press

By WALTER B. LENHART,
Bishop Creek, Calif.

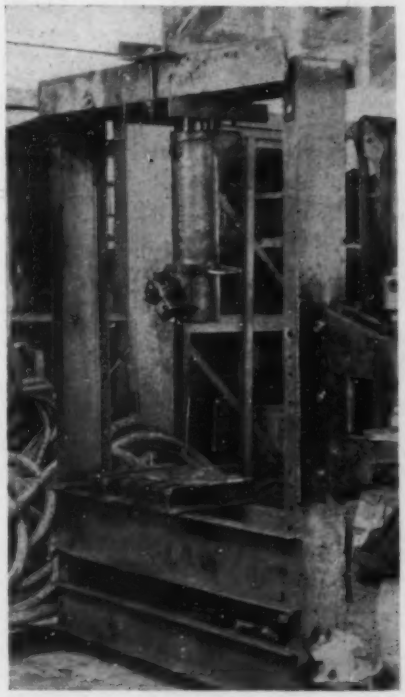
A PRESS FOR REMOVING various machinery parts that have been pressed on in fabrication, or for removing end bells from motors which have frozen bearings is almost a necessity around any plant, yet it is surprising the number of operators that depend on chains and ordinary screw jacks or some similar makeshift for such work.

To do this work at one plant a suitable frame of heavy "I" beams was electrically welded. This frame acted as the support for a heavy type hydraulic jack which was suspended from the top horizontal member. The base is made up of similar heavy "I" beams with steel rails as cross members. The work is placed on the steel rails, and after adjustments the pressure applied. This press is heavy enough for the largest jobs around the plant.

Welded to this frame (at right in illustration) is a small screw-type jack that is used for the smaller work.

Since the illustration was taken, the top "I" beam has been replaced with one mounted in a vertical position for greater strength.

The electric welder made this device during spare time, and it has paid for itself a hundred fold in the few years of its life.

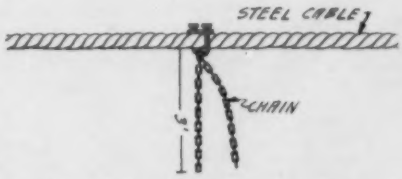


Hydraulic press that has solved a difficult plant problem

A Trouble Helper

By DAVE PARIS,
Monrovia, Calif.

IN THE ACCOMPANYING ILLUSTRATION is shown a chain attached to the tail line on a drag bucket. This chain is for helping the tail line dig itself out of a cave-in. At one time the writer had the experience of having a tail line covered with about 40 ft. of sand and gravel caused from a cave-in. Where the line was covered there happened to be a large knot where the cable had been broken and tied together. As the digging went on ahead of the cave-in and this knot was being pulled back and forth through the sand and gravel the knot kept working its way up and in less than one hour's time it was free. By using a chain I find the same results can be obtained. This is a very simple trick but gratifying in results.

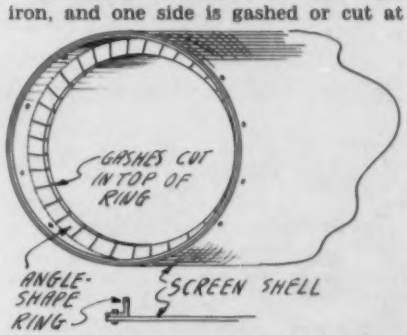


Simple device for extricating the tail line on a drag bucket from cave-ins

Obtaining More Accurate Sizing

WHEN MATERIAL IS SIZED in a revolving screen, there is likely to be a certain amount of the fines pass on with the rejects because the material was not held in the screen for a long enough time. At the Fontana, Wis., plant of the Moulding-Brownell Corporation, a device is in use to hold the material in the lower end of the screen long enough to completely remove the fines. This is a sheet metal strip bolted on the inside of the screen at the lower end, which stands up about 2 in. high, and holds the fines, while allowing the rejects to roll over it and pass out of the screen.

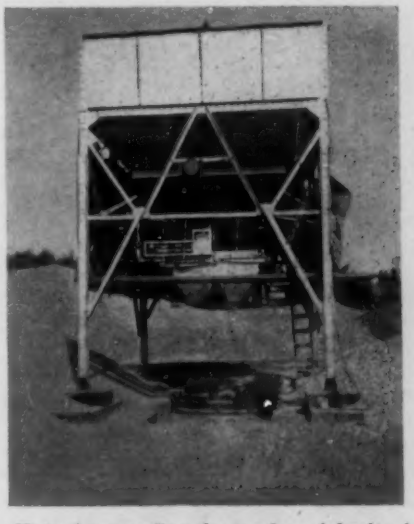
This retaining strip is made from a piece of sheet metal 4 or 5 in. wide, folded along its length like an angle iron, and one side is gashed or cut at intervals of about 2 in., down to the fold. After the gashing is completed, the strip can be readily bent to a circular shape to fit the inside of the screen. Holes are drilled in the uncut side of the strip, and this surface is then bolted flat against the inner screen surface. The strips can be made large enough to go completely around the inside of the screen, but it is usually more convenient to use two strips, each long enough to reach halfway around.



Sketch of revolving screen fitted with device to hold fines

Loading Tally Saves Bookkeeping

DES MOINES SAND AND FUEL CO. Operative Association, Des Moines, Iowa, saves a lot of bookkeeping in the batching out of sand and gravel from its new 105 cu. yd. Butler batching bin. An old street car fare register was purchased for a small sum and mounted on the batching floor as a registering tally. The operator merely pulls the register cord which records the load and rings a bell each time a load goes out.



Meter for recording the number of loads of aggregates trucked out

NATIONAL ASSOCIATION *Activities*

New York State Crushed Stone

ABOUT 30 producers of crushed stone met at the Hotel Syracuse, Syracuse, N. Y., October 21, to put a little more pep into the activities of the New York State Crushed Stone Association. The principal subject of discussion was the employment of an all-time secretary or manager. While action was deferred to a later meeting in November, it would appear that the members of the association are unanimously in favor of the employment of such a manager—preferably an engineer.

H. H. Wagner, general manager of the Pennsylvania Stone Products Association, Harrisburg, Penn., contributed materially to the discussion by describing his work in Pennsylvania, where he has increased the membership of the state association from about 20 to 80 producers, now representing about 85 per cent of the state's production of crushed stone.

A. T. Goldbeck, director of engineering and research of the National Crushed Stone Association, was present to outline the trend of recent specifications and research, putting particular emphasis on the increasing use of the Los Angeles rattler test and the probability that it would be universally adopted in place of the other tests for hardness and toughness of aggregates. The present tests in some instances are wholly different for each of the three aggregates, which make comparisons difficult.

J. R. Boyd, administrative director, National Crushed Stone Association, described the work of the association and the necessity of an organization in Washington to carry on. The proof of this is so evident to every reader of ROCK PRODUCTS, that its repetition here seems hardly necessary. Mr. Boyd did, however, present a splendid case for the National Association.

The secretary of the New York State Construction Council, Thomas E. Wright, Rochester, N. Y., was present to make a plea for greater financial support for his organization, which is working year in and year out to prevent diversion gasoline tax and motor vehicle license fees in New York State. This diversion of highway money has reached such a point that the State is spending about 20 per cent of its highway funds for improvement of highways.

There is to be a constitutional convention in the near future, one of the objectives of which is the adoption of an amendment which will prohibit this diversion. Mr. Wright promised that next years road-building program would probably be around $50,000,000 instead of $20,000,000 as at present, and that if constitutional amendment is adopted $100,000,000 a year would be regularly applied to highway construction.

1938 Conventions

AMERICAN Road Congress, Machinery Show and convention of American Road Builders' Association, Cleveland, Ohio, January 17-22.

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NATIONAL Crushed Stone Association, annual convention and machinery exhibit at Cincinnati, Ohio, January 24-26, incl., Netherland Plaza Hotel.

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NATIONAL Sand and Gravel Association, annual convention and machinery exhibit at Cincinnati, Ohio, February 1-3, incl., Netherland Plaza Hotel.

• • •

NATIONAL Ready Mixed Concrete Association, annual convention and machinery exhibit, February 1-3, incl., Netherland Plaza Hotel.

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ENGINEERING DIRECTOR, A. T. GOLDBECK, has been appointed to represent the National Crushed Stone Association on American Standards Association Committee on Building Code Requirements and Good Practice Recommendations for Masonry A 41, and also on Committee C-12 on Mortars for Unit Masonry of the American Society for Testing Materials. He has been active recently on the analysis of ballast data in connection with his work on the Ballast Committee of the American Railway Engineering Association. Much attention is also being given to the research work of the Association, involving the use of screenings and quarry fines, particularly in low cost surfaces. Work on stone sand is also being continued, particularly to study gradation and its effect on the physical properties of concrete.

Efforts of the National Crushed Stone Association to increase membership are bearing fruit. The following new Active members have been reported: Consumers Co., 111 W. Washington St., Chicago, Ill.; Dolese and Shepard Co., 111 W. Washington St., Chicago, Ill.; and Mid-West Rock Products Corp., 806 Majestic Bldg., Indianapolis, Ind. New Associate members include: Earle C. Bacon, Inc., 17 John St., New York, N. Y.; Dempster Brothers, Inc., Box 3063, Knoxville, Tenn.; The Osgood Co., Marion, Ohio; Peoria Steel and Wire Co., Inc., Box 52, Peoria, Ill.; Screen Equipment Co., 9 Lafayette Ave., Buffalo, N. Y.

Industrial Sand

BOARD OF DIRECTORS of the National Industrial Sand Association met at the Palmer House, Chicago, Ill., October 5 and discussed various subjects of vital importance to the industry, including the effects of state occupational disease legislation, and the possibility of Federal legislation in this field.

Stanton Walker, director of engineering, reported on research facilities and possible projects. V. P. Ahearn, executive secretary, gave a resumé of Federal legislation and projected legislation and its possible or probable effects on the industry. Labor relations and a discussion of labor contracts were considered at some length.

1938 Convention

In honor of E. M. Ayers, president of the Ayers Mineral Co., Zanesville, Ohio, recognized universally as the dean of the silica sand industry, the directors voted to hold the third annual convention of the association at Zanesville in May 1938, that being the time of Mr. Ayers' fiftieth wedding anniversary. The exact dates will be announced later.

Present at the Meeting

The following directors and producers were present: A. Warsaw, president of the association, Wedron Silica Co., Chicago; R. G. Hay and E. M. Ayers, the Ayers Mineral Co., Zanesville, Ohio; E. J. Beyer, Michigan Silica Co., Rockwood, Mich.; Frank D. Chadwick, Standard Silica Corp., Ottawa, Ill.; William C. Cook, Standard Silica Corp., Chicago, Ill.; R. G. Hay, the Ayers Mineral Co., Zanesville, Ohio; P. S. McDougall, Ottawa Silica Co., Ottawa, Ill.; A. J.

Miller, Whitehead Brothers Co., New York City; Chas. G. Runkle, the Ayers Mineral Co., Zanesville, Ohio; Ralph T. Stevens, Cape May Sand Co., Cape May, N. J.; G. A. Thornton, Ottawa Silica Co., Ottawa, Ill. Representing the Washington, D. C., office of the association were V. P. Ahearn, executive secretary, and Stanton Walker, director of engineering.

Freight Rates

Among other activities of the association is opposition to projected increases in freight rates on industrial sand. This opposition will be continued because the association members are convinced that higher rates will reduce the volume moved by rail and seriously upset existing distribution arrangements.

Ohio Concrete Vault Meeting

OHIO CONCRETE BURIAL VAULT ASSOCIATION held its annual meeting at the Neil House, Columbus, Ohio, October 20 and 21, the first annual meeting since the national association was founded in 1929. In fact, the National Burial Vault Association is the outgrowth of the Ohio group.

The session was presided over by Calvin Bell, of the Permanent Burial Vault Co., Miamisburg, Ohio, and president of the Ohio Burial Vault Association, Ross Hilles of Alliance, Ohio, acted as temporary secretary. Speakers included: H. A. Dahlquist, of the Sterling Concrete Vault Co., Inc., Chicago, and president of the National Concrete Burial Vault Association, who spoke on the value of association activities, national legislation, and reported on the conventions of the National Funeral Directors Association and the National Selected Morticians held in September: Russell Knight, executive secretary of the Ohio Funeral Directors' Association; W. F. Lockhardt, of the Vacuum Concrete Corporation, who gave an illustrated talk on the vacuum process of placing concrete; P. M. Woodworth, of the Portland Cement Association, on concrete vault construction; and F. H. Connors, of the Solvay Sales Corp., on calcium chloride as used in burial vault manufacture.

An interesting demonstration also was arranged for the delegates at the Engineering Experimental Station, Ohio State University, through the courtesy of A. M. Lendrum, Norwalk Vault Co., Norwalk, Ohio.

Officers elected were: President, Lowell K. Huber, Huber-Baxter Co., Cincinnati; vice president, Wm. Fithian, Fithian Cement Products Co., Youngstown; and secretary-treasurer, E. C. Jeffries, Safety Vault Corp., Cleveland.

Slag Producers Meet In Pittsburgh

NATIONAL SLAG ASSOCIATION held the annual directors' meeting in Pittsburgh, Pa., October 7 and 8. Representatives of companies that handle 85 percent of the annual tonnage of crushed and screened blast furnace slag produced in the United States attended the meeting. The following officers were elected: For president, Geo. A. Mattison, Jr., Woodstock Slag Corporation, Birmingham, Ala.; vice president, L. E. McDermut, Illinois Slag & Ballast Co., Chicago, Ill.; and secretary-treasurer, H. J. Love.

Sand-Lime Brick Meeting

A REGIONAL MEETING of the Sand-Lime Brick Association was recently held in Minneapolis, reports J. Morley Zander, secretary of the national association, and head of the Saginaw Brick Co., Saginaw, Mich., who attended the Twin City meeting. Although no date has has yet been set for the annual meeting of the national association, it will probably be in February.

Lime

MIDWEST AGRICULTURE LIMESTONE INSTITUTE will hold its annual convention at French Lick, Ind., on November 12 and 13. In addition to agricultural limestone producers, there will be in attendance representatives from the University of Illinois, Purdue University, the Illinois Geological Survey and the Illinois Agricultural Association. Topics for discussion will include: Cooperative advertising, uniform terms and discounts, sales tax, and traffic matters. Manufacturers of grinding machinery and limestone spreaders have been invited to attend the meeting.

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Highway Research Board will hold the annual meeting in Washington, D. C., at the National Academy of Sciences, from November 30 to December 3, inclusive.

●

TENTATIVE PLANS OF THE NATIONAL LIME ASSOCIATION provide for a series of public meetings for the discussion of uses of lime in construction. One meeting will be held in each of the four States of Florida, Alabama, Georgia, and North Carolina. The probable dates set for these meetings will be December 6 to 10, inclusive.

SELF-PRESERVATION

IN a search for the reason why some individuals and companies do not participate in or support Association activities, quite often it is found that an entirely selfish attitude is taken with respect to the benefits to be derived from membership.

Associations do not exist to promote the business of the individual or company, except as they may function to improve the welfare of the entire industry of which the individual is a part. When these so-called independents are approached for membership, the answer very often has been, "I cannot see where the Association will benefit my business."

These independents who do not join with the majority in Association work forget that the forces which are working against their best interests are not those who are engaged in the same business, but they are entirely alien influences. These forces cannot be opposed by individuals or even large companies; they must be fought through the united action of the industry functioning through an Association.

An easy way to evaluate Association activity is to answer the following questions: Can an individual or company afford the expense to present an effective case in legislative hearings? Is it possible for an individual to gain recognition in the establishment of standards and specifications? How may an individual effectively fight a nation-wide battle for markets in the face of competition from foreign lands? These questions illustrate just a few of the problems that are faced by every business which can only be met through strong Association representation.

No individual is as big as the industry of which he is a part, and in this day of almost universal organization of every phase of our lives, it is more urgent than ever that the individual support the Association which is working for the best interests of the industry as a whole—even if it be for no other reason than self-preservation.

Join your association, and support it financially and with your services. Too often the association member assumes that his obligation ends with the payment of dues. Regular payment of dues is commendable, but very often support in conducting the affairs of the association is of even more importance than the relatively small sums paid for membership. Those who have served their association gain in dividends of experience much more than they lose in time taken from their business. If your Association has done an effective job in solving your problems, write to the officials and tell them about it. Remember they serve thousands of members who may be aptly termed the "boss", and they like to receive commendation for a job well done as well as the "kicks".

With the coming of the New Year, preparations are now going forward to make the conventions bigger and better than in the past. In the final analysis, however, each member will get out of the convention as much as he puts into it. Only through attendance at these conventions is it possible to learn about the latest developments in new equipment and more profitable methods of conducting your business. Will YOU be there?

Recent Quotations on Rock Products Securities

Stock	Date	Bid	Asked	Dividends	
Aetna P. C., cap.	9-27-37	22	..		
Allentown P. C. (Penn.), com.	8-24-37	6	..		
Allentown P. C. (Penn.), 6% cum. pfd.	9-27-37	9½	..		
Alpha P. C., com.	10-25-37	12¾	..		
American Aggregates, 1st mtg. 3/6's 1945, new bonds[42]	10-16-37	80	..		
American Aggregates, 6's 1943[65]	10-16-37	80	..		
American Aggregates, com.[42]	10-16-37	2½	3½		
American Aggregates, pfd.[42]	10-16-37	25	..		
Arundel Corp., com.	10- 9-37	18¼	..	.25	Oct. 1
Ash Grove L. & P. C., com.	9-27-37	11½	..		
Ash Grove L. & P. C., pfd.	9-27-37	94	..		
Bessemer L. & C., com.	9-15-37	6	7½		
Bessemer L. & C., pfd[42]	9-15-37	26	..		
Bessemer L. & C., 6½'s, 1947[65]	10-16-37	92	96		
Bessemer L. & C., 6's, 1955	10-15-37	93	95½		
Boston S. & G., com.[21]	10-18-37	1	2		
Boston S. & G., pfd.[37]	10-18-37	5½	8		
Boston S. & G., 7's 1939[21]	10-18-37	80	..		
Calaveras Cement, com.[60]	10-21-37	4	5		
Calaveras Cement, 7% pfd.[60]	10-21-37	..	99½	2.00	Sept. 30
California Art Tile,, A[9]	10-20-37	8	10		
California Art Tile, B[9]	10-20-37	1	1½		
Canada Cement, com.[62]	10-23-37	..	11		
Canada Cement, pfd.[62]	10-23-37	..	95		
Canada Cement, 4¼'s, 1951[62]	10-23-37	99½	100½		
Canada Crushed Stone, 5½'s, 1944	10-23-37	98	1-1		
Carolina P. C., 8% cum. pfd.	8-24-37	42	..		
Consol. Cement, A	9-27-37	2½	6		
Consol. Cement, 1st 6's 1950[65]	10-14-37	68	71		
Consol. Okla. S. & G., 6½'s 1948	No market				
Consol. S. & G. pfd.					
Consol. Rock Products, units[60]	10-16-37	.40	.80		
Consumers B. & G. 1st Mtg., 6's, 1948	8-24-37	35½	38½		
Coosa P. C., 1st 6's	9-27-37	58	..		
Coplay Cement Mfg., pfd.[30]	10-18-37	15	18		
Coplay Cement Mfg., 6's 1941[30]	10-15-37	92	..		
Cumberland P. C., units[63]	9-27-37	42	..		
Cumberland P. C., 7's, 1937					
Dewey P. C., com. (new)	9-27-37	62	..		
Diamond P. C.[28]					
Ingles & Shepard					
Federal P. C., 5's 1947	8-24-37	62	..		
Federal P. C., 6½'s 1941[65]	10-16-37	60	..		
Fla. P. C., units[60]	10-16-37	25	27		
Fla. P. C., 6½'s 1937[65]	10-15-37	100	..		
Giant P. C., com.[66]	10-14-37	1	2½		
Giant P. C., pfd.[36]	10-14-37	11½	13½		
Glens Falls P. C., com.	9-27-37	12	16		
Glens Falls P. C., pfd.	8-24-37	86	92		
Great Lakes P. C., B	9-27-37	½	..		
Gyp., Lime & Alabastine	10-23-37	6	9		
Gyp., Lime & Alabastine, 5½'s, 1948[42]	10-23-37	97	99		
Hercules Cement, com.	9 27-37	44	..		
Ideal Cement, com.[50]	10-16-37	22½	24½	.50	Sept. 30
Kelley Island L. & T.	9-28-37	21½	23		
Ky. Rock Asphalt, 6½'s, 1936[65]	10-15-37	42	45		
Ky. Stone Co., v.t.c.[65]	10-15-37	6	10		
Ky. Stone Co., 5%, 1956[65]	10-15-37	46	..		
Keystone P. C., pfd.[31]	9-27-37	30	..		
Lawrence P. C., com.	10-23-37	15½	17½		
Lawrence P. C., 5½'s, 1942[30]	10-14-37	100	..		Called Oct. 1
Lehigh P. C., com.	10-23-37	20⅝	..	.37½	Nov. 1
Lehigh P. C., 4% pfd.	10-23-37	101	..	.37½	Nov. 1
Lone Star Cement, com.	10-23-37	58	..	.75	Sept. 30
Louisville Cement	10-23-37	35	40		
Lyman-Richey, 1st 6's, 1939-40	8-24-37	68	..		
Marbellite Corp., com.[65]	10-21-37	½	1		
Marbellite Corp., pfd.[65]	10-21-37	3	4½		
Marblehead Lime, 7's, 1944[14]	10-20-37	85	90		
Marquette Cement, com.	8-23-37	43	44		
Marquette Cement, pfd.[30]	10-16-37	100	105		
Material Service Corp.[30]	10-16-37	14½	16		
McCrady-Rodgers, com.[26]	10-18-37	No mkt.			
McCrady-Rodgers, 7% pfd.[26]	10-18-37	20	35		
Medusa P. C., com.	10-23-37	25	..		
Medusa P. C., 6% cum. pfd.[62]					
Minnesota Mining & Mfg. Co.	10-23-37	30⅛	..	.60	Sept. 30
Missouri P. C.					
Monarch Cement, cap.					
Monolith P. C., com.[9]	10-20-37	No market			
Monolith P. C., 8% pfd.[9]	10-20-37	3	4		
Monolith P. C., 1st mtg.[9]					
Monolith Portland Midwest, pfd.[9]	10-20-37	2½	3		
National Gypsum, A., com.	10-23-37	7¾	..		
National L. & S., 6½'s, 1941[60]	10-15-37	99	..		
Nazareth Cement, com.[60]	10-14-37	8	10		
Nazareth Cement, 7%, pfd.[30]	10-14-37	80	85		
Newaygo P. C., pfd.					
New England Lime, units[14]	10-20-37	..	16		
N. Y. Trap Rock, 7% pfd.[46]	10-15-37	60	..		
North Amer. Cement, 6½'s, 1953[30]					
North Amer. Cement "A" pfd.[30]	10-14-37	3	6		
North Amer. Cement, com. A[30]	10-14-37	2½	4½		
North Amer. Cement, 6½'s, 1940[30]	10-14-37	70	..		
North Amer. Cement, 6¼'s, 1943[30]	10-14-37	73	..		
North Amer. Cement, 6½'s, 1953[30]	10-14-37	28	..		
North Amer. Cement "B" pfd.[30]	10-14-37	5	8		
North Shore Mat., 1st 6's[30]	10-14-37	43	..		
Northwestern P. C., units					
Northwestern States P. C.[30]	10-17-37	22	25		
Ohio River S. & G., com.[46]	10-15-37	10	..		
Ohio River S. & G., 1st pfd.	10-23-37	79	..		
Ohio River S. & G., 2nd pfd.	10-23-37	4	..		
Ohio River S. & G., 6's	10-23-37	1	..		
Oregon P. C., com.[60]	10-21-37	2½	3¼		
Oregon P. C., 1st pfd.[60]	10-21-37	97	..		
Oregon P. C., conv. pfd.[60]	10-16-37	47	50		
Pacific Coast Aggr., new com.[49]	10-21-37	1.50	1.60		
Pacific Coast Cement, com.					
Pacific P. C., com.[60]	10-21-37	1	4		
Pacific P. C., pfd.[60]	10-21-37	45	50		
Peerless Cement, com.[30]	10-16-37	2	3¾		
Penn.-Dixie Cement., com.	10-23-37	4¾	..		
Penn.-Dixie Cement, pfd., A	10-23-37	22¾	..		
Penn.-Dixie Cement, 6's A, 1941					
Penn. Glass Sand Corp., v.t.c.	10-23-37	15½	..		
Penn. Glass Sand Corp., pfd.[21]	10-23-37	117	..		
Penn Glass Sand Corp., 1st mtg. 4½'s, 1960					
Petoskey P. C., com.[30]	10-16-37	7½	8½		
Republic P. C., com.[31]					
Riverside Cement, A[9]	10-20-37	9	10		
Riverside Cement, B[9]	10-20-37	2	2¾		
Riverside Cement, pfd.[9]	10-20-37	90	95		
Santa Cruz P. C., pfd.[9]	10-20-37	30	35	.50	Oct. 1
Schumacher Wallboard, com.[9]	10-20-37	1½	2		
Schumacher Wallboard, pfd.[9]	10-20-37	13½	17½		
Signal Mt. P. C., com.[60]	10-16-37	1	2		
Signal Mt. P. C., pfd.[30]	10-16-37	55	57		
Signal Mt. P. C., units[61]					
Southern States P. C., cap.[31]					
Spokane P. C., units					
Standard Pav. & Mat., com.[62]	10-23-37	3⅛	3¼		
Standard Pav. & Mat., pfd.[62]	10-23-37	..	32		
Standard Silica, com.				.20	Sept. 15
Superior P. C., pfd.					
Superior P. C., A[60]	10-21-37	34	50		
Superior P. C., B[60]	10-21-37	11½	14		
Southwestern P. C. units[60]	10-21-37	190	..		
Trinity P. C., units[30]	10-14-37	80	..		
U. S. Gypsum, com.	10-23-37	73½	..		
U. S. Gypsum, pfd.	10-23-37	158¼	..		
Volunteer P. C., 1st 7's, 1942[65]	10-15-37	90	..		
Volunteer P. C., units[65]	10-15-37	80	..		
Vulcanite P. C., com.[65]	10-16-37	7	9½		
Vulcanite P. C., 7½'s, 1943[65]	10-15-37	90	..	call for	Nov. 1
Wabash P. C.[30]	10- 9-37	8	12		
Warner Co., ww. 1st 6's, 1944[65]	10-15-37	66	68		
Warner Co., com.[30]	10-14-37	3	5		
Warner Co., pfd.[30]	10-14-37	8	12		
Whitehall Cement Mfg., com.[31]					
Whitehall Cement Mfg., pfd.[31]					
Wisconsin L. & C., 1st 7's, 1946[14]	10-20-37	85	95		
Wolverine P. C., com.					
Yosemite P. C., 4% pfd.[60]	10-21-37	2	3¾		

Quotations by [9]A. E. White Co., San Francisco, Calif. [14]The Securities Co. of Milwaukee, Inc., Milwaukee, Wis. [21]Wise, Hobbs & Seaver, Inc., Boston. [26]Martin Judge Jr., and Co., San Francisco, Calif. [28]Nesbitt, Thomson & Co., Ltd., Toronto, Ont. [30]First National Bank of Chicago, Chicago, Ill. [31]Hewitt, Ladin & Co., New York, N. Y. [36]Rogers & Tracy, Inc., Chicago, Ill. [37]Paul D. Sheeline & Co., Boston, Mass. [42]Merrill, Turber & Co., Cleveland, Ohio.

THE FINANCIAL PAGE . .

RECENT DIVIDENDS ANNOUNCED

Riverside Cement Co., pfd. (Q)	$1.50	Nov.	1
Santa Cruz Portland Cement	.50	Oct.	1
Monarch Cement Co.	2%	Oct.	5
Lone Star Cement Corp.	.75	Sept.	30

ALPHA PORTLAND CEMENT CO., Easton, Penn., has announced earnings for the twelve months' period ending September 30:

	1937	1936
Net sales	$6,723,653	$6,487,991
Operating expenses	5,232,622	4,712,296
Depreciation and depletion	1,161,164	1,146,862
Operating profit	329,867	628,833
Other income	139,131	144,660
Total income	468,998	773,493
Fed. income taxes (est.)	77,041	97,139
Income charges	38,773	34,113
Minority interest (cr)	.....	3,405
Net profit	353,184	645,646
Common dividends	644,600	644,600
Surplus for periods	(d)291,416	1,046

PEERLESS CEMENT CORP., Detroit, Mich., reports for the nine months ending September 30, 1937 a net profit of $205,401 as compared with $195,791 for the same period in 1936. Earnings per share for this period in 1937 are $0.67 as against $0.65 in 1936.

Balance Sheet, as of Sept. 30:

Assets:	1937	1936
Plant & equipment (net)	$1,949,186	$2,020,970
Current Assets:		
Cash	447,863	485,504
Receivables (net)	226,305	231,964
Inventories (net)	391,162	236,609
Other assets	30,562	38,658
Prepaid expenses	.....	44,344
Total	$3,045,078	$3,058,050
Liabilities:		
Common stock (par $1)	$306,563	$301,562
Funded debt	1,287,200	1,803,963
Other long term debts	341,575	33,200
Current Liabilities:		
Account payable	67,946	105,260
Accrued int. & taxes	27,728	26,827
Land contract due	.....	5,000
Capital surplus	553,123	.....
Earned surplus	460,943	782,238
Total	$3,045,078	$3,058,050
Current assets	$1,065,330	$954,077
Current liabilities	95,674	137,087
Working capital	969,656	816,990

CALIFORNIA ART TILE CORP., Los Angeles, Calif., reports for the fiscal year ended September 30, 1937, a net profit of approximately $48,000, or about $3 a share on 16,000 shares of class A stock, on which there are dividends in arrears. In the same period a year ago, the company reported a net profit of $36,725, or $2.30 a share on the same number of class A shares.

YOSEMITE PORTLAND CEMENT CORP., Merced, Calif., has extended to December 31, 1937 the time within which holders of class A stock may exchange their holdings for new $10 par preferred in accordance with the recapitalization plan approved in 1936. The company also extended to the same date the time within which outstanding fractional share scrip may be converted into preferred stock.

PENNSYLVANIA-DIXIE CEMENT CORP., New York, N. Y., reports earnings for the twelve months' period ending September 30, 1937:

	1937	1936
Net sales	$6,121,419	Not stated
Cost, expense, ordinary tax, etc.	4,782,219	.....
Depreciation and depletion	†781,948	.....
Operating profit	557,261	.....
Other income	36,532	.....
Total income	593,793	$422,236
Interest	489,549	517,242
Federal income taxes	.....	168,771
Net profit	104,244	(d)263,777
Earned per share, pfd.	$0.86	.....

No. of pfd. shares, 121,200.

†For period from Jan. 1, 1937, to Sept. 30, 1937, depreciation has been charged to operations on the basis of cost of properties to predecessor companies, which is also the basis allowable for Federal income taxes. Additional provision for depreciation amounting to $558,850, together with $3,448 on account of properties written off, has been reflected in the transfer out of the special reserve.

LONE STAR CEMENT CORP., New York, N. Y., reports consolidated earnings for nine months to September 30, 1937:

	1937	1936
Sales	$16,372,735	$13,527,348
Manufacturing and shipping costs	8,207,279	6,591,135
Selling and administration expenses	1,826,943	1,581,912
Depreciation and depletion	2,132,532	2,099,604
Operating profit	4,205,981	3,254,697
Other income	154,628	113,166
Total income	4,360,609	3,367,863
Interest, etc.	2,626	341,514
Fed. inc. taxes, etc.	674,929	531,736
*Misc. charges	552,427	443,278
Net profit:		
March quarter	735,704	468,304
June quarter	1,188,733	746,981
Sept. quarter	1,206,189	836,049
9 months	$3,130,626	$2,051,334
Earnings per share	$3.24	$2.60
Number of shares	967,095	789,755

*Obtained by deducting earnings for the first nine months from earnings for the fuel year.

LEHIGH PORTLAND CEMENT CO., Allentown, Pa., has reported for the twelve months ending September 30, 1937, a net profit of $1,289,928, equal, after deducting $279,473 dividends paid on the 4 percent convertible preferred stock, to $1.34 each on 754,430 shares of $25-par outstanding common stock. Based on twelve months' dividend requirements on 56,752 shares of 4 percent preferred stock outstanding at the close of the period, the balance of earnings for the twelve months' ending September 30 is equal to $1.41 a common share. The net profit for the twelve months ending September 30, 1936, totaled $2,207,863. Foreign competition on the Atlantic seaboard has been responsible for the lower net profit of this company, according to financial news reports.

Agricultural Lime Demand Involved in Conservation

THE 1938 FEDERAL AGRICULTURAL CONSERVATION PROGRAM will play an important part in stimulating the demand for agricultural lime. To qualify for payments under this program, the farmer must perform certain soil conserving practices, one of which relates to liming. In areas designated by the Regional Director as areas in which the average cost of agricultural limestone to farmers is as follows, the farmer will receive about $2.00 for the application of the designated quantities of material:

Average Cost of Limestone	Pounds per Acre	Approximate Payment
(a) Not over $1.50 per ton	3000	$2.00
(b) $1.51 to $2.50 per ton	2000	$2.00
(c) $2.51 to $3.50 per ton	1500	$2.00
(d) $3.51 to $5.00 per ton	1000	$2.00
(e) over $5.00 per ton	800	$2.00

The above figures do not limit the farmer to certain specified rates of application; he may apply more or less than the specified rates and be paid accordingly.

Belt Manual

THE B. F. GOODRICH CO., Akron, Ohio, has printed a new, 20-page manual on the care and maintenance of conveyor and elevator belting. Profusely illustrated with drawings and actual job photographs, the manual discusses such topics as (1) Why care of rubber belts is worth while; (2) Saving belt wear at loading points; (3) Protecting belts from trapped lumps; (4) How reduced speeds save belts; (5) How to make conveyor belts run straight; (6) Belt wear controlled by idler spacing; (7) Excessive tension—causes and remedies; (8) Effects of light, heat, cold and moisture; (9) How to install conveyor belts; (10) Fasteners; (11) Breaking in; (12) Splicing and repairing; (13) Specifying new conveyor belts; (14) Elevator belts—causes of rapid wear and injuries; (15) Elevator belts—how to install; tension formula. This manual is not technical, but is written in practical language for practical operating men.

TRAFFIC and TRANSPORTATION

Proposed Rate Changes

THE FOLLOWING are the latest proposed changes in freight rates up to and including the week of October 16:

Trunk

36321. **A. Sand** (other than ground or pulverized or naturally bonded molding), and **gravel**, in open top cars, without tarpaulin or other protective covering, C. L. **B. Sand and gravel** (other than ground or pulverized), in closed cars or in open top cars with tarpaulin or other protective covering, C. L. **C. Sand**, ground or pulverized, C. L., (See Note 3), from Flanders, N. J. Proposed rates in cents per net ton):

To			
Cleveland, O.	A310	B310	C341
Youngstown, O.	A290	B290	C319
Mansfield, O.	A320	B320	C352

In lieu of present rates.

36323. **Sand** (other than industrial), in open or in closed equipment, and **gravel**, C. L., (See Note 3), from Buffalo, N. Y., stations, Carroll St., Louisiana St., Ohio St., Erie St., Black Rock, East Buffalo and Harriet, N. Y., to Westfield, Mass., $2.95 per net ton, in lieu of present sixth class rate 26c per 100 lb.

36325. **Crude dolomite**, C. L., (See Note 3), from Willville, W. Va., to Conshohocken, Penn., $1.58 per net ton, in lieu of present sixth class rate.

Sup. 4 to 36228. **Lime**, common, hydrated, quick or slaked, and **dry building mortar**, C. L., min. wt. 30,000 lb., and **lime**, common, hydrated, quick or slaked, C. L., min. wt. 50,000 lb., to points on the D. & N. R. R. in New York state from Southern Ry. points named in Agent Hecker's I. C. C. 217, rates made 60c per net ton over East Branch, N. Y.

36329. **(A) Sand** (other than industrial), in open top cars without tarpaulin or other protective covering. **(B) Sand** (other than ground or pulverized), in closed cars. **(C) Sand**, naturally bonded moulding, in open or closed cars. (See Note 3), from Daguscahonda, Penn., to Orillia, Ont.: (A) $4.05, (B) and (C) $4.45 per net ton, in lieu of present class rates.

36228 (Sup. 3). **Lime**, common, hydrated, quick or slaked, and **dry building mortar**, C. L., min. wt. 30,000 lb., and **lime**, common, hydrated, quick or slaked, C. L., min. wt. 50,000 lb., to points on the D. & N. R. R. in New York State from C. & O. Ry. points named in Agent Hecker's I. C. C. 217, rates made 60c per net ton over East Branch, N. Y.

36332. **Ground limestone**, C. L., min. 60,000 lb., from Oriskany Falls, N. Y., to Afton, Bainbridge, Unadilla, Wells Bridge, N. Y., $1.30; Harpursville, Nineveh, Otego, N. Y., $1.35; Port Crane, Sanitaria Springs and Tunnel, N. Y., $1.45 per net ton, in lieu of present rates.

36333. **Limestone**, crude, fluxing, foundry and furnace, when shipped in open top equipment, C. L., (See Note 3), from Martinsburg, W. Va., to Bethlehem, Penn., $1.85 per net ton, in lieu of present rate $2.31 per gross ton.

36336. **Crushed stone**, C. L., in open top equipment, (See Note 3), from Snow Flake, W. Va., to Cheat Junction, Glady, W. Va., $1.50, Laurel Bank, W. Va., $1.70 and Webster Springs, W. Va., $1.80 per net ton, in lieu of present rates. Reason: Based on the Buckland scale.

36353. **Limestone**, ground or pulverized and/or **stone dust**, C. L., min. wt. 60,000 lb., from Linville and Zirkle, Va., to points of destination shown in Agt. Hecker's Tariff I. C. C. No. 216, various rates on same basis as now applicable from Riverton, Strasburg Junction, Va., etc., to same destinations.

36354. **Dolomite, roasted** (refractory dolomite) in granular form, treated or untreated, clinkered and/or burnt to a dead heat, C. L., min. wt. 60,000 lb., from Billmyer, Penn., to Rockaway, N. J., $2.13 per net ton, in lieu of present 6th class rate 18c per 100 lb.

36363. To provide for rates on **moulding gravel** from Philadelphia, Penn., to points in Canada shown in Items 8145 to 8215 of Agent Curlett's Tariff I. C. C. No. A-520 on the same basis as is currently in effect on moulding sand.

Central

52230. To cancel all commodity rates on **slag** (a product of iron or steel blast or open hearth furnaces), not ground or pulverized, in bulk, in open top equipment, and **crushed stone**, from Rock Points, Penn., to points in Ohio, Penn. and W. Va., published in B. & O. R. R. Tariffs I. C. C. 22774 and I. C. C. 21523, and similar rates in other individual lines' tariffs, Classification basis to apply in lieu thereof.

52253. To establish on **concrete mix**, consisting of **cement and sand**, or of **cement, sand and gravel, dry** (the amount of cement in the mixture not to exceed, in any case, 25 percent), in paper sacks, C. L., min. wt. 30,000 lb., from Cincinnati, O., to Huntington, 11½c; Charleston, 13c, and Logan, W. Va., 13½c. Route: Via C. & O. Ry. direct.

52271. To establish on **(a) sand**, naturally bonded moulding, in all kinds of equipment, C. L.; **sand** (except naturally bonded moulding; ground or pulverized sand), in closed equipment, C. L.; **(b) sand**, ground or pulverized, in all kinds of equipment, C. L.; and **(c) sand** (except naturally bonded moulding; ground or pulverized sand), in open top equipment, C. L. (see Note 3), but orders will not be accepted for closed and open top cars of less marked capacity than 60,000 lb. wooden frames (paper boxes), viz: corrugated and 80,000 lb., respectively.**

From the Michigan City, Ind., Group (rates in cents per net ton):

	—Proposed Rates—		
To	(a)	(b)	(c)
Boston, Mass.	465	507	465
Fairfield, Conn.	445	486	445
Plainville, Conn.	445	486	445
Providence, R. I.	485	529	485
St. Johnsbury, Vt.	490	534	490
Seymour, Conn.	445	486	445
Torrington, Conn.	445	486	445
Westfield, Conn.	450	491	450

52272. To establish on **crushed stone and stone screenings, also agricultural limestone**, C. L., from Huntington, Ind., to points in Michigan.

(Representative to Michigan Points)		
	(1)	(2)
Sturgis	105	135
Nottowa	107	135
Wosepi	110	140
Vicksbury	112	150
Kalamazoo	117	150
Plainwell	117	160
Bradley	122	165
Moss	127	170
Grand Rapids	130	175
Edgerton	135	185
Hiram	137	185
Reynolds	140	195
Big Rapids	142	195
Reed City	147	205
Kenney	132	175
Conklin	135	185
Muskegon	140	195
Fowlerville	140	185
Grand Ledge	135	175
Sanfield	140	185
Lake Odessa	140	185
McCords	140	185
Grand Haven	145	185
Nuncia	140	185
Marne	140	175
Ada	140	175
Ionia	145	195
Pewano	150	195
St. Johns	150	195
Owaso	145	185

*Note—The oil, tar and/or asphaltum not to exceed 10% by weight of the commodity shipped, the shipper to so specify on shipping orders and bills of lading.

**When a shipper orders a car of above mentioned marked capacities or greater, and the carrier is unable to furnish car ordered and furnishes a car of greater capacity than that ordered, the min. wt. for the car furnished will be that which would have obtained had the car ordered been furnished and used.

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

(1)Proposed rates on crushed stone and stone screenings.

(2)Proposed rates on agricultural limestone.

52275. To amend Item 7540-B of C. F. A. L. Tariff 130-Y (Exceptions to Official Classification), naming rates on **stone**, crushed; slag and/or gravel, coated with oil, tar or asphaltum, in open top equipment, C. L., from various points in Ohio to stations in Ohio, applicable on intrastate shipments only, by providing for the addition of "Fort Jefferson, O.," as a point of origin therein.

52278. To establish on **limestone, ground or pulverized**, unburnt, C. L., min. wt. 60,000 lb., from Ridgeville, Ind., to Chicago, 185c, and Sycamore, Ill., 205c per net ton.

52279. To establish on **agricultural limestone**, ground or pulverized, C. L., min. wt. 60,000 lb., from Valmeyer, Ill., to Terre Haute, Ind., 175c per net ton. Route: Via Mo. Pac. R. R., E. St. Louis, Ill., P. R. R.

52280. To establish on **(a) sand**, naturally bonded moulding, in all kinds of equipment, C. L.; **sand** (except naturally bonded moulding; ground or pulverized sand), in closed equipment, C. L.; **(b) sand**, ground or pulverized, in all kinds of equipment, C. L.; and **(c) sand** (except naturally bonded moulding; ground or pulverized sand), in open top equipment, C. L.; (see Note 3), but orders will not be accepted for closed and open top cars of less marked capacity than 60,000 lb. and 80,000 lb., respectively** from Nashua, Penn., to Farrell, Penn., (a) 90c; (b) 99c, and (c) 60c per net ton.

52288. To establish on **limestone**, ground or pulverized, unburnt, C. L., min. wt. 60,000 lb., from Alton, Ill., to Akron, O., 315; Ashtabula, O., 335; Battle Creek, Mich., 265; Cincinnati, O., 235; Cleveland, O., 315; Columbus, O., 275; Dayton, O., 235; Detroit, Mich., 295; Elkhart, Ind., 235; Evansville, Ind., 175; Ft. Wayne, Ind., 235; Indianapolis, Ind., 205; Kalamazoo, Mich., 265; LaFayette, Ind., 205; Logansport, Ind., 215; Louisville, Ky., 215; Michigan City, Ind., 225; Muncie, Ind., 225; Napoleon, O., 265; Nappanee, Ind., 235; Port Huron, Mich., 315; Richmond, Mich., 315; St. Clair, Mich., 315; Sandusky, O., 295; South Bend, Ind., 235; Terre Haute, Ind., 175; Toledo, O., 275; Wabash, Ind., 225; Williamsport, O., 275; Youngstown, O., 335.

52293. To cancel specific commodity rates now published in C. F. A. L. Tariff 155-T, on **limestone**, crushed, ground or pulverized, in barrels, boxes or sacks, C. L., min. wt. 40,000 lb., from Piqua, O., to Fond du Lac, Wis., 19½c; Green Bay, Wis., †22-19½c; Madison, Wis., 20½; Oshkosh, Wis., 19½; Portage, Wis., 21½; Wausau, Wis., 23½; Winona, Minn., 25.

†Other than in barrels, boxes or sacks.

Sixty percent of sixth class, published in Item 4715 of C. F. A. L. Tariff 130-Y, on limestone, crushed, ground, or pulverized, not burnt, min. wt. 50,000 lb., viz.:

To Fond du Lac and Green Bay, Wis., 17; Madison, Wis., 16; Oshkosh, Wis., 17; Portage, Wis., 18; Wausau, Wis., and Winona, Minn., 22, to apply in lieu thereof.

52381. To establish on stone, crushed, slag and gravel, coated with oil, tar or asphaltum*, in open top cars, in straight or mixed C. L., from Weirton, W. Va., to points in W. Va. and Penn. shown below, on basis of I. C. C. Dkt. 22598 (Shaw Junction) single line scale as follows, in cents per net ton.

	Rate
20 miles and under	73
40 miles and over 20 miles	83
60 miles and over 40 miles	108
80 miles and over 60 miles	118
100 miles and over 80 miles	128

52399. To establish on stone, industrial, (unburned), in bulk in open top cars, from Annandale, Branchton, Harrisville and Osbornes, Penn., to Pittsburgh, Penn. (B. & O. R. R. delivery), 75c per gross ton. Route: Via B. & L. E. R. R., Butler, Penn., and B. & O. R. R.

52445. To establish on limestone, agricultural, unburnt, in bulk, in open top equipment, and screenings, agricultural limestone, C. L., from Spore, O., to Caledonia and Marion, O., 60c per net ton.

52446. To establish on stone, crushed, slag and gravel, coated with oil, tar, or asphaltum*, in open top equipment, C. L., from Charleston, W. Va., to Gilbert, W. Va., 160c per net ton, via N. Y. C. R. R., Deepwater Bridge, W. Va., Virginian Ry.

52480. To establish on core sand, in open top cars only, C. L., from Lehigh, Ill., to Alexandria, 125c; Anderson, 135c; Brazil, Ind., 125c; Cincinnati, Dayton, O., 200c; Decatur, 135c; Elkhart, 115c; Fort Wayne, 135c; Frankfort, Ind., 105c; Hamilton, O., 185c; Kendallville, 135c; Kokomo, 115c; Logansport, 105c; Marion, Ind., 125c; Middletown, O., 200c; Mishawaka, 115c; Montpelier, Muncie, 135c; South Bend, Ind., 115c; Springfield, O., Terre Haute, Wabash, 125c, and Warsaw, Ind., 115c per net ton.

52485. To establish on crushed stone and crushed stone screenings, in bulk, in open top cars, C. L., to Cincinnati, O., from Piqua, 100c, and Cedarville, O., 95c per net ton.

52540. To establish on stone, crushed, in open top equipment, C. L., from Kenton, O., to Osborn, O., 95c per net ton.

52548. To establish on crushed stone, in open top cars, C. L., from Findlay, O., to Stickney, 70c; Malinta, 75c; Napoleon, Gerald, 80c; Wauseon, Ottokee, 85c, and Denson, O., 90c per net ton.

52549. To establish on core sand, C. L., in open top equipment only, from Attica, Ind., to Lafayette, 65c; Peru, 95c; Wabash, 100c; Ft. Wayne, 125c; Crawfordsville, 75c; Kokomo, 95c; Indianapolis, 100c; Terre Haute, Ind., 90c; Danville, 65c; Springfield, 125c; Hoopeston, 80c; E. St. Louis, Ill., St. Louis, Mo., 170c, and Mattoon, Ill., 105c per net ton.

52553. To establish on limestone, agricultural, unburnt, in bulk, in open top equipment, and screenings, agricultural limestone, C. L., from Spore, O., to Newcomerstown, Kimbolton, 115c; Oldham, 125c; Cambridge, *115c; Byesville, Caldwell, 125c; South Olive, 135c, and Marietta, O., *135c per net ton.

*Now published via B. & O. R. R. in N. Y. C. Tariff I. C. C. L. S.-1649.

52554. To establish on crushed stone and crushed stone screenings, in bulk, in straight or mixed C. L., in open top cars, from Scioto and White Sulphur, O., to Coldwater, O., 105c per net ton.

52555. To establish on sand (except Industrial), in open top cars, C. L., from Elkhart, Ind., to Michigan City, Ind., 80c per net ton. Route: Via N. Y. C.-South Bend, Ind.-M. C. R. R.

52573. To establish on ground or pulverized limestone, in box cars, C. L., min. wt. 60,000 lb., from Sibley, Mich., to Ashford, 200c; Bowmansville, 190c; Carrollton, 205c; Cattarangus, Clymer, 200c; East Aurora, 195c; Ellicottville, 200c; Elma, 190c; Forestville, 200c; Great Valley, 205c; Lancaster, 190c;Limestone, Little Valley, 205c; Orchard Park, 190c; Ripley, 195c; Salamanca, 205c; Silver Creek, Springville, Westfield, 195c; West Valley, 200c; Akron, 215c; Allegany, 235c; Clarence, Crittenden, 215c; Crystal Lake, Elton, Farmersville, Franklinville, 225c; Freedom, Hinsdale, 235c; Humphrey, Machias, 225c; Olean, 235c; South Wales, Town Line, Transit, 215c and Westons, N. Y., 235c per net ton.

Southern

15584. This submittal, included in Docket 905, assigned for Sept. 20, 1937, hearing, amended to suggest: Fuller's earth, C. L., min. 70,000 lb. Establish rates in cents per net ton, as follows:

To	From Mobile, Ala.	From Quincy, Fla.
Fort Wayne, Ind.	680	700
Indianapolis, Ind.	620	660
Terre Haute, Ind.	600	640
Chillicothe, Ohio	680	...
Columbus, Ohio	680	...
Delaware, Ohio	680	700
Marion, Ohio	700	...

15696. Fuller's earth, C. L., min. 70,000 lb. Establish 820c net ton from Ochlocknee, Ga., to Mt. Pleasant, Mich.

15752. Roofing granules, C. L., min. wt. 80,000 lb. Establish 570c net ton from Granville, N. Y., and Gladhill, Penn., to Memphis, Tenn.

15774. Fluxing stone, C. L. Establish 40c net ton from Burns, Tenn., to Lyle, Tenn.

15793. Lime, C. L. Establish 550c, C. L., min. 30,000 lb., and 458c net ton, C. L., min. 50,000 lb., from St. Louis, Mosher and Ste. Genevieve, Mo., to Fernandina, Fla.

15795. Calcite, roasted, C. L. Establish 528c per ton from Martinsburg and Millville, W. Va., to Gadsden, Ala.

15860. Lime, fluxing, C. L., min. 70,000 lb. Establish 272c net ton from Sherwood, Tenn., to Cincinnati, Ohio, and Newport, Ky.

15835. Phosphate rock and phosphate limestone, C. L. Extend expiration date in connection with rates from L. & N. and N. C. & St. L. stations in the Mt. Pleasant-Centreville district to Buffalo, N. Y., Chicago, Chicago Heights, Ill., Cleveland, O., Detroit, Mich., Sandusky, O., Toledo, O., Joliet, Ill., Lansing, Mich., and intermediate points from December 31, 1937, to December 31, 1938.

Western

E-41-225. Sand, naturally bonded, molding, C. L. (See Note 3), but orders will not be accepted for closed and open top cars with marked capacity of less than 60,000 lb. and 80,000 lb., respectively, from Gladstone, Ill., to destinations in Mich. and Wis. To respresentative points.

To	Prop. Rate
Abbotsford, Wis.	$2.40
Appleton, Wis.	2.30
Eau Claire, Wis.	2.30
Fond du Lac, Wis.	2.20
Green Bay, Wis.	2.30

E-41-227. Limestone, broken, crushed or ground, C. L. (See Note 3), but in no case less than 40,000 lb., from St. Louis, Mo., and E. St. Louis, Ill. (Rates in cents per 100 lb.)

To	Pres.	Prop.
Minneapolis, Minn.	14	†
Norwood, Minn.	27	16
Winthrop, Minn.	27	16
New Ulm, Minn.	28	17
St. James, Minn.	25	14
Sherburn, Minn.	25	14

† No change.

E-55-11. Vermiculite, other than crude, C. L., between points in W. T. L. territory, min. wt.: Present—24,000 lb., subject to Rule 34. Proposed—24,000 lb. per car used. Rates—Class 27½ (no change).

E-151-15. Feldspar, C. L., min. wt. 50,000 lb. per standard gauge car. Rates in cents per ton of 2000 lb., except as noted. Proposed rates:

To	(a)
Group 1 (Miss. River)	(1)(C)485(A)575
Group 2 (Peoria)	(3)(B)695
Group 3 (Chicago)	(A)695
Group 4 (St. Paul)	(A)725

To	(b)
Group 1 (Miss. River)	(1)(C)460(A)550
Group 2 (Peoria)	(3)(B)670
Group 3 (Chicago)	(A)670
Group 4 (St. Paul)	(A)700

(a) From Black Hawk, Colo., Rollinsville, Colo., Tolland, Colo.

(b) From Forks Creek, Colo.

(C) Minimum weight 80,000 lb.

(1) Applicable only on traffic destined to points east of the Ill.-Ind. state line.

(3) Will not apply to where rates are provided in Item 3072 of W. T. L. Tariff 111-I.

(A) Minimum weight marked capacity of car.

(B) Minimum weight marked capacity of car, but not less than 60,000 lb.

The above is a list of representative points.

E-151-16. Feldspar, C. L., min. wt. 80,000 lb. Rates in cents per ton of 2000 lb. Proposed rates:

To	(a)	(b)
New Orleans, La.	(C)955	(C)930
Jackson, Miss.	(C)(1)825	(C)(1)800

(a) From Black Hawk, Colo., Rollinsville, Colo., Tolland, Colo.

(b) From Forks Creek, Colo.

(C) Minimum weight 80,000 lb.

(1) Under W. T. L. Application D-151-8 rate of 700c per ton, min. wt. 80,000 lb., was approved from Denver, Colo., etc., to Jackson, Miss., subject to the concurrence of the S. F. A., and in the event this rate is approved we propose to establish a rate of 725c per ton, min. wt. 80,000 lb., from Black Hawk, Rollinsville and Tolland, and a rate of 700c per ton, min. wt. 80,000 lb., from Forks Creek, Colo.

New England

42637. To cancel obsolete rate on 14c on talc and soapstone, ground or pulverized, other than talc and soapstone testing not less than 99 percent through 200 mesh screen, in straight or mixed C. L., min. wt. 70,000 lb., from Chester, Vt., to Boston, Mass., for export, and apply in lieu thereof classification basis.

Southwestern

12327. To establish rates on feldspar, C. L., min. wt. 50,000 lb. and higher from Black Hawk, Rollinsville and Tolland, Colo., based 25c per ton higher than the rates formerly in effect from South Platte, Colo., also the same rates from Forks Creek, Colo., as were formerly in effect from South Platte, Colo.

12400. To establish rates based on the I. C. C. Docket 12704 plussed scale on plaster and related articles, as described in Item 5-B, S. W. L. Tariff 219, I. C. C. 2511, C. L., min. wt. 40,000 lb., from Acme, Plasterco, Plasterco Junction, Rotan and Sweetwater, Tex., and El Dorado, Okla., to destinations in C. F. A. territory, using same destination grouping published in WTL Tariff 324, I. C. C. No. A-2546. Distances to be computed on the average mileage of all Texas producing points and El Dorado, Okla.

12447. To establish rates on dry building mortar (consisting of a mixture of portland cement, lime and shale), from, to and between Southwestern and Western Trunk Line territories, in straight C. L. or in mixed C. L. with hydraulic, portland or natural cement, min. wt. 50,000 lb., except when the marked wt. capacity of car is less, in which event the marked wt. capacity of the car will be the min. wt., but the min. wt. is not to be less than 40,000 lb., same as is currently applicable on portland cement.

SCREW CONVEYOR ACCIDENT

Claims Another Life When Cover Plate Collapses

UNFORTUNATELY, THE FATAL ACCIDENT described this month is another mishap directly connected with that old offender, the screw conveyor. The scene was laid in the coal department of a cement plant. The screw conveyor involved carries coal from the dryer elevator to the storage bins from which it is fed into the Fuller mills for pulverizing.

Two repairmen were installing a guard over the projecting end of the screw shaft, at the end of the elevator. When it became necessary, in the course of the work, for one of the workmen to cross to the other side of the conveyor, he attempted to push himself over it, instead of walking around, which was fully as easy, and the natural thing to do.

The victim knelt on the lid with both knees and as he was about to swing himself around, so that he could step off on the other side, the cover crumpled beneath him and his legs went down into the screw box, mangling them to the pelvis. Death occurred two hours later. He left a wife and three children aged 18, 16 and 5.

Some Facts About the Case

The man who lost his life in this accident was not inexperienced. He had had 14 years' experience as a repairman and he was considered competent and trustworthy. He had learned first hand, long before, that screw conveyors are dangerous. He had once helped to pull what was left of a man out of one—and he thoroughly understood that under no circumstances were repairs to be made or any work done on *moving machinery*.

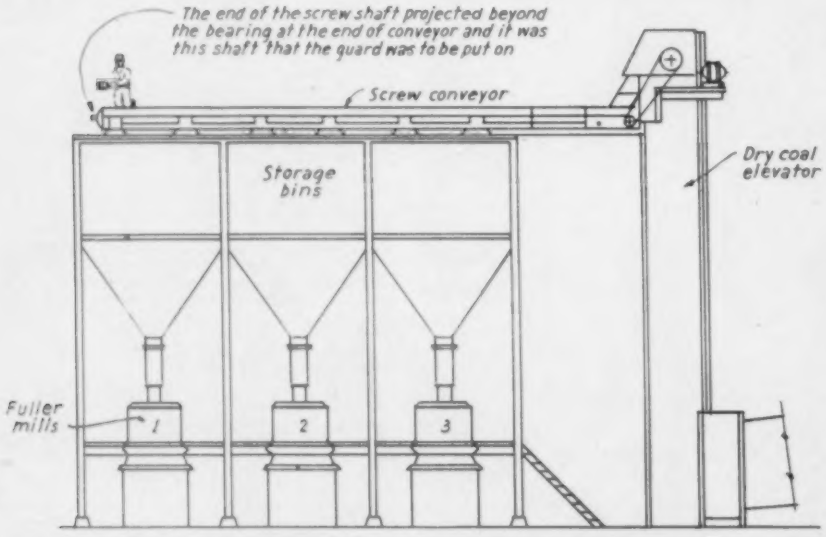
But this screw conveyor looked perfectly safe. The cover was in place. Intent on what he was doing, he evidently forgot all about the commonsense, generally understood rule, KEEP OFF ALL SCREW CONVEYORS. Possibly this man had formed a habit of getting across conveyor boxes in this way, but it is hard to understand why he did so in this case, as it would have been fully as easy to walk around.

Investigation showed that highly corrosive sulphur dioxide and moisture in the coal, together with heat generated and occasional friction, had weakened the metal cover to a point where it would not sustain a man's weight. How did it happen that this condition was not discovered?

Coal grinding department operators know or certainly should know of the rapid corrosive action on steel of the sulphur dioxide and moisture in coal. It is often necessary to repair leaks in coal conveyors and whole sections wear out comparatively quickly and have to be replaced. Doesn't it follow that screw conveyor lids should be inspected frequently and that *special* care should be taken to keep men off of them?

No one can inspect a department quite so thoroughly as the man who works there. Would it not be well for each plant department to uncover the *hidden* dangers an outsider might not suspect and make doubly sure they can not cause injury or death? Should a tragedy like this be necessary to make individuals, departments and plants *think* about safety in terms of engineering, education and the enforcement of essential safety rules?

The mill in which this ghastly fatality occurred proposes to use heavier gauge sheet metal plates for coal conveyor covers and to make weekly inspections of them so that they can be replaced at the first sign of weakness. Hindsight may prevent the recurrence of this tragedy *at this mill*, but WHAT ABOUT ALL OTHER MILLS? Must others have an accident of this kind in order to learn their lesson?



Coal conveyor top collapsed under weight of repairman who needlessly knelt upon it. He might have stepped around the end of the conveyor just as quickly and as easily

What Precautions for Screw Conveyors

For years deadly screw conveyors have taken the lives of cement workers. If you agree that the following precautions will save lives, *by all means put them into effect AT ONCE!* If you feel that undue emphasis is placed on them, reflect a moment on the value of a man's life! Here they are:

1. KEEP OFF OF ALL SCREW CONVEYORS. Men who persist in disobeying common sense safety rules formu-

(Continued on page 91)

QUARRY SHOTS . . .

Historic Quarry Reopens for Business

RAYMOND J. SCHIRM, of San Francisco, Calif., two years ago purchased the limestone deposits in Lime Kiln Gulch near Los Gatos, Calif., and is now operating the quarry. This quarry, which supplied almost forgotten lime kilns in operation 75 years ago, will supply a limestone product used in refining beet sugar at Salinas, Calif. John T. Maluvius is superintendent of the new development. Crews of workmen have been building new bunkers and erecting crushing machinery. The rock will be hauled by truck down the gulch to a spur track on the Los Gatos-Santa Cruz division of the Southern Pacific railroad.

To Reorganize Lime Company

GLENCOE LIME & CEMENT CO., St. Louis, Mo., has filed a petition in the United States District Court, seeking to reorganize under the amended bankruptcy act. In its petition, the company declared that since last January its business has been interfered with by the activities of labor organizers, and that labor trouble has caused it to suffer severe losses since last March.

Quarry Supplies Rock For 350 Miles of Highway

R. NEWTON MCDOWELL CO., has opened a quarry east of Pumpkin Center, Mo., to crush rock for the city of Graham. This company was the low bidder on nearly 350 miles of resurfacing work on Missouri State highways in Divisions No. 1 and No. 4, and will probably furnish the largest amount of crushed rock from the new quarry.

Fort Peck Dam Bids Dec. 3

A LARGE MARKET FOR AGGREGATES and cement is expected to result from the award of contracts for the construction of Fort Peck Dam by U. S. Army Engineers. The bids will be opened at 11 a.m., December 3, 1937, at Kansas City, Mo. The preliminary work to be done for which bids have been invited include: Completing the concrete work in the main control shafts and their foundations (25,000 cu. yd. of concrete), and the construction of four separate concrete buildings above the main shafts. Each of the four buildings will be 39 ft. wide by 52 ft. long, and 36 ft. from the ground level to the top of the roof.

Open New Quarry In Washington

THE BROOKFIELD CO., Astoria, Wash., is preparing to open a quarry up the river about two miles from Cathlamet. Bunk houses are now being built, and a pile dock and fender will be constructed as soon as permission can be received from the War Department. A rock crusher will be installed and shovels will be placed in service. In addition to crushed rock, the new quarry will supply rock for rip-rapping and other general building purposes. The quarry in Brookfield also will be operated.

Quarry Wins Safety Trophy Two Years

KRAUSE, NO. 1 QUARRY, Columbia Quarry Co., St. Louis, Mo., has chalked up an unusual safety record. On September 23, this quarry completed five years without a Lost Time Accident and for two consecutive years has won the Safety Trophy of the National Crushed Stone Association Contest, supervised by the United States Bureau of Mines, details of which appeared in the October issue of ROCK PRODUCTS.

Stone Company Has "Black Top" Plant

THE CUSHING STONE CO., Hancock, N. Y., has completed improvements to its plant, including the erection of facilities to make Amiesite or black top. Sixty men are employed in the enlarged plant, and production has been at a high level supplying State, Township, and County highway projects with crushed stone and Amiesite. In addition to the plant at Hancock, N. Y., eight other plants are operated in the northern part of the State.

THE SIXTEENTH EXPOSITION OF CHEMICAL INDUSTRIES will be held at Grand Central Palace, New York City, December 6 to 11. Of particular interest to the industrial minerals industry will be the display of machinery in the crushing and grinding equipment section.

Quarry Used for Power Plant Water Supply

NATIONAL LIME AND STONE CO., quarry at Bluffton, Ohio, will be used for a unique purpose by the Central Ohio Light and Power Co. A 370-ft. intake tunnel is being blasted through solid rock at the quarry to be used in securing an adequate supply of cooling water for condensing purposes in the large generating plant which will soon be completed by the power company. The tunnel intake opening is 10 ft. high and 7 ft. wide. When completed, a dividing partition will be placed in the tunnel so that one-half of the tunnel will be used as an intake for cool water from the depth of the quarry while the other side will serve as an outlet for water that has been used in the cooling system of the power plant.

Substantial Gain In Lime Productionn

FINAL 1936 FIGURES ON THE LIME INDUSTRY in the United States prepared by the U. S. Bureau of Mines show that production totaled 3,749,383 short tons valued at $26,933,719. This represents an increase of 26 percent in quantity and 24 percent in value compared with 1935. Sales of hydrated lime, which are included in the above totals, amounted to 1,225,829 tons valued at $9,529,743, an increase of 22 percent in quantity and 20 percent in value. The average unit value of all lime in 1936 was $7.18 a ton compared with $7.28 a ton in 1935; hydrated lime showed a decrease from $7.90 a ton in 1935 to $7.77 a ton in 1936. The total number of plants that reported operations in 1936 was 301, the same as in 1935.

Lime for agricultural purposes represented sales totalling 336,905 tons valued at $2,108,787, an increase of 19 percent in quality and 11 percent in value; for construction, 891,267 tons valued at $7,589,346, an increase of 36 percent in quantity and 33 percent in value; dead-burned dolomite for furnace refractories, 596,751 tons valued at $4,887,243, an advance of 31 percent. Ohio, the largest producer of this product, had an output of 314,924 tons valued at $2,746,800 in 1936. Other producing States are Alabama, Illinois, Pennsylvania, and West Virginia.

Shipments of metallurgical lime totaled 572,574 tons valued at $3,491,701. The 26 percent increase in shipments is partly attributable to greater steel-making activity. Chemical lime, of which the paper industry is a large consumer, increased 21 percent. Other outlets also showed improvement, including water purification, tanneries, glass works, and miscellaneous chemical works.

Hobbies, Foibles and

Personalities of Rock Products Men

But this Month Our Story Is Mainly About Two Women

IN RETIRING FROM her active capacity as chemist and executive of the Allwood Lime Co., Manitowoc, Wis., Miss Mary E. Squire takes with her the respect of the entire lime industry for her achievements in the chemistry of lime and as a builder of company morale, seldom equalled in any industrial organization.

Too little has been said or written about her philosophy which has inspired devotion and loyalty to the company and herself and has contributed materially to the progress of the industry and the company which she served as chemist so faithfully and well.

Advancing years caused Miss Squire's retirement in 1935, but she maintains a lively interest in the concern, conducts chemical analyses and acts in an advisory capacity when called upon.

In her place has come another woman, Mrs. Mable K. Lounsbury, at present director of the National Lime Association, to carry on the relationships and traditions set by Miss Squires over a period of many years.

Mrs. Lounsbury is not a chemist, but has a vast fund of previous business experience from which she draws to efficiently conduct the business affairs of the company.

In her past connections, she has served as a teacher, as an outstanding local business woman, and brings to good use in her present capacity the legal knowledge gained from years of service in the Manitowoc Juvenile Court.

Since assuming her duties in 1935, Mrs. Lounsbury handles all business matters, has travelled widely, and will continue to do so, contacting the company's dealers and jobbers.

President Wm. J. Tills, to the left, and Mrs. M. K. Lounsbury, vice-president, to the right

Natural and proper industrial and human relationships have not only made available the best in a man for the good of the company, but have brought out qualities which are desired but seldom realized in the average working man.

The workmen at the Allwood Lime Co., have a desire to save money, and to a man voluntarily authorize the company to place a percentage of each salary check in the bank. The children of every employe are encouraged to acquire at least a four-year high school education, and sons of workmen are hired, upon completion of their education, to work in the plant if they so desire, and there is a place for them.

There is practically no turnover of labor at the plant, with the attendant loss in working efficiency always accompanying the breaking in of new men. Orders and commands are out of place, and each man has been an employe of the company for many years. Familiarity with his routine and job, and a desire to pull for the common good rather than the completion of a task solely for a salary brings out the best in the man at this plant—and voluntarily. Practically all employes of the plant are 20-yr. men, headed by William J. Tills, now president, and Paul Gosz, superintendent with 26 years' service.

Each employe at Allwood lives in a company-owned house, rent free, and is allotted a two-acre tract of land where he can raise his own vegetables. In slack business times and even when employed regularly, a workman has an added source of income from the crops he raises.

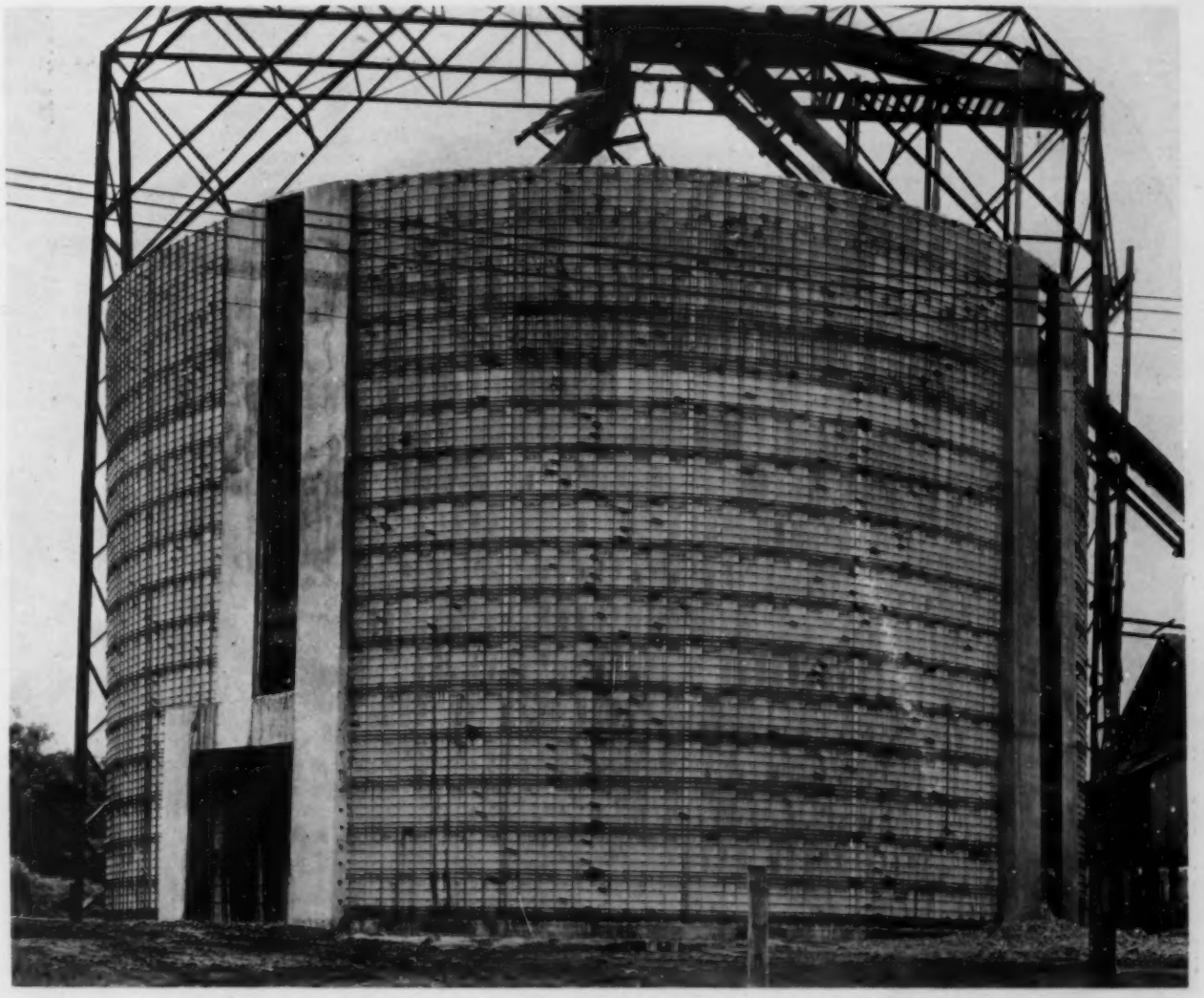
Athletics and other outside activities are not overlooked. The company sponsors a softball team that is the champion of Manitowoc county, and has a modern ball field complete with grandstands for the use and benefit of employes and their families. Healthy working conditions and a happy working environment have and will continue to pay dividends to the Allwood Lime Co.

The proven experience of this concern in its industrial relations with workmen and its interest in their families and well being, with a full realization that a man is an individual and not a cog in a machine, could profitably be put into practice by both small and large concerns processing industrial minerals.

A group of Allwood Lime Co. employes. President Tills, at the extreme right, has been with the company since 1911

Concrete Products
Cement Products

A Big Market for Concrete Products

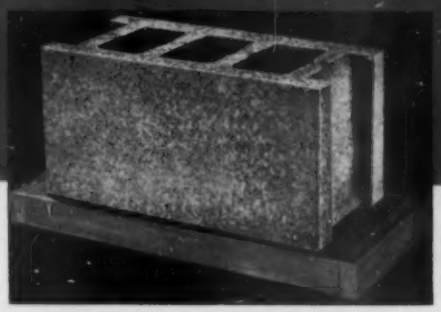


Concrete stave silo, measuring 70 ft. in diameter and 40 ft. in height with a capacity of 5000 tons of silage, was erected by the Mason and Laurence Silo Co., Elgin, Ill., for the Keene Belvidere Canning Co., Belvidere, Ill. Its unusual size is interesting, but each of the 3500 standard staves making up the exterior wall are identical with those whose sale has been so vastly stimulated this year by good crops

NEW PROFITS

From Concrete Masonry Units With FULLY PRESSED TOP

Wide-spread popularity of units with FULLY PRESSED TOP insures new and greater profits from increased volume of business. These better units are made only on Besser Plain Pallet Strippers—the only block machines making all units on ONE SET OF PLAIN PALLETS.



BESSER PLAIN STRIPPER PALLETS EITHER STEEL OR WOOD

GREATER ECONOMY IN EQUIPMENT

Old type machines are being replaced with Besser Plain Pallet Strippers because—they cost less than a few sets of Cored Pallets to make the new sizes—labor cost is less—the units made are far superior. For new plants buyers find in comparing prices that the cost of a Besser Plain Stripper with Mold and Plain Pallets to make 3 or 4 different units is less than half the cost of any other type machine of equal capacity with molds and the several sets of Cored Pallets required for the same units. In all plants—new or old—Bessers lead in economy.

G. Rapoli, Inc., of Medford, Mass., found an eager market for units with FULLY PRESSED TOP in the Boston metropolitan area.

BESSER PLAIN PALLET STRIPPERS

FULLY AUTOMATIC—3 Models—Capacities: 2000 to 4000 units per day.
SEMI-AUTOMATIC—4 Models—Capacities: 1000 to 2000 units per day.
POWER OPERATED with Hand Controls—2 Models—Capacities: 500 to 1000 units per day.
MULTI-MOLD—Hand Operated—Capacities: up to 300 units per day. For manhole blocks, brick slabs and small cored units.
AUTOMATIC BRICK MACHINES—Capacities from 10,000 to 50,000 units per day. For brick, slabs, coal cubes and other small units.

Besser Plain Pallet Strippers are made under one or more of the following Patents of which Besser Mfg. Co. is sole owner.

No. 1,472,399 by S. H. Pettengill
No. 1,572,305 by A. P. Nelson
No. 1,699,218 by J. H. Besser
No. 1,706,647 by J. H. Besser

These are the only patents ever granted on concrete stripper block machines using plain pallets, and they completely cover the basic plain pallet stripper principle. Other patents pending on improvements. No firm or individual is licensed or allowed to make machines under any of these patents.

Write for Besser Plain Pallet Stripper Catalog

BESSER MANUFACTURING CO.

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BESSER BATCH MIXERS

In All the Standard Capacities
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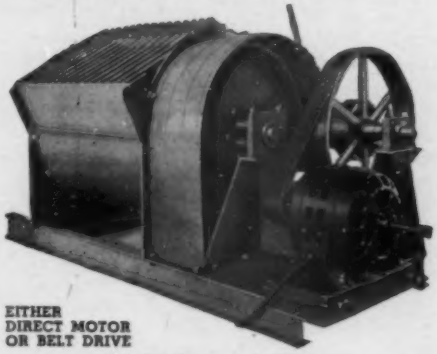


EITHER DIRECT MOTOR OR BELT DRIVE

Ask for Illustrated Catalog

EVERY CONCRETE PRODUCTS PLANT NEEDS A BESSER PLAIN PALLET STRIPPER

Fully Automatic, Pneumatically-Operated Equipment For

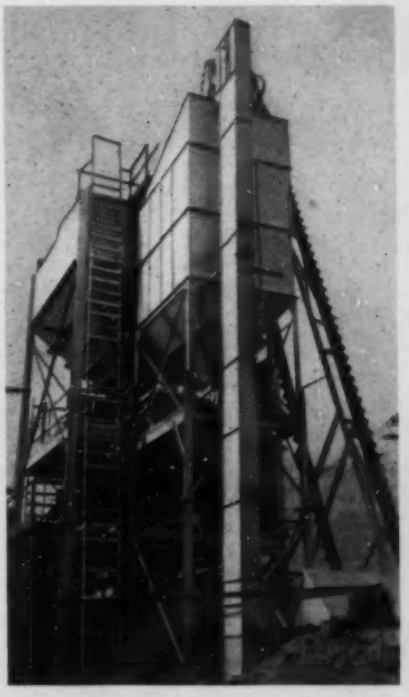
CENTRAL MIXING PLANT

By GEO. D. ROALFE
Contributing Editor, Los Angeles, Calif.

A UNIQUE CENTRAL MIXING PLANT has been built by George A. Fuller, general contractor for the new $7,298,440 post office in Los Angeles, Calif., to provide concrete for this project. The structure will require the placement of 60,000 cu. yd. of concrete in the foundations and superstructure. E. E. Davis, concrete superintendent for the contractor, is in charge of this phase of the work.

The central mixing plant was designed to receive all materials in bulk. It is located on the site, which covers more than an average city block. Aggregates are ordinarily delivered to the mixer by trucks in two sizes, namely, sand and crushed rock. The receiving hopper of the mixer contains two compartments, one for the fine, and the other for the coarse aggregate. To obviate the usual difficulty encountered with washed concrete sand, that of bridging at the discharge gate, an electrically driven agitator, located in the hopper in close proximity to the gate, has been provided. The agitator, driving shaft and motor are all set at an angle parallel to the hopper floor, with the motor in the clear of the entire hopper. The aggregates are elevated from their respective bins by a continuous bucket elevator on 87-ft. centers, fitted with 14-in. buckets, to a steel hopper-bottom bin, having a gross live capacity of 200 tons. It is so arranged as to provide facilities for the handling of up to four different sizes of fine and coarse aggregates, although in the normal operation only two are used.

Trucks delivering portland cement discharge their loads into the receiving hopper which has an upper tapered section for receiving the cement load from the end gate of the delivering truck. This tapered section forms the upper portion of a surge or holding bin with a capacity of 75 bbl. of bulk cement. Along the lower edge and for its complete width, is located a screw conveyor which transports the cement to the cement elevator. The vertical type cement elevator, fitted with 10-in. buckets, is fully enclosed in a steel housing, and discharges into an elevated steel storage bin with a capacity of 500 bbl.. All portions of the cement circuit are fully enclosed and relatively dust free.



Concrete mixing plant showing bulk cement elevator in the foreground, the aggregate bucket elevator to the right, and aggregate bin at the left

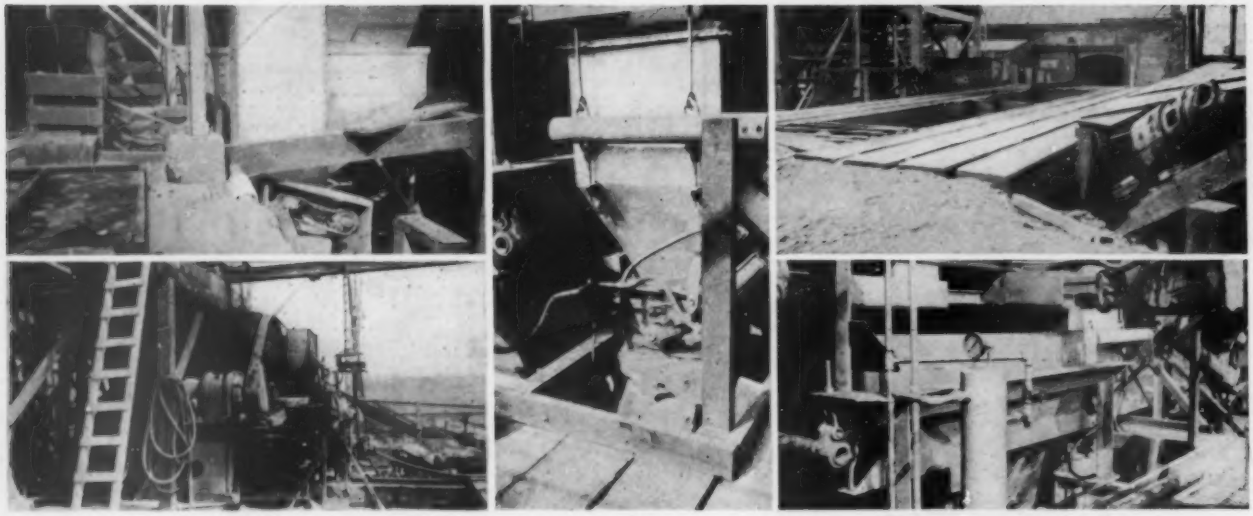
Fully Automatic Batching Equipment

Batching equipment is of the pneumatic, electrically-controlled type. In every respect it is fully automatic, with the exception of the admixture which is added to the mix manually. The aggregate batcher will handle the materials, with the exception of cement, for a cubic yard batch. In addition to being fully automatic, it is selective for from one to four different sizes of aggregates, but as previously mentioned, only two sizes are ordinarily handled. The cement is batched through a separate hopper. This is accomplished by a screw conveyor driven through a reduction gear with a V-belt drive from an individual motor, the operation of which is controlled through the automatic weighing devices. All weights are set on beam scales which in turn actuate the entire electrical control system. All gates are pneumatically operated and controlled electrically. After the weights are set, the pushing of a button actuates the complete operation of weighing out a batch. Its discharge, to the mixers, however, is manually controlled.

Thorough Mixing With Special Equipment

For the actual mixing of the concrete, the contractor has installed two 1 cu. yd. Rex mixers. The dumping of the batch and its diversion to the proper mixer are under control of the operator. Each of the mixers is equipped with saddle water tanks which positively regulate the quantity of water entering the batch. The mixers are fed from the aggregate batchers by a split chute which is joined at its junction point by a chute from the cement batcher. By this means the force of the sliding aggregate is utilized to carry the cement into the mixer and prevent it from being held due to bridging.

In the ordinary plant this would be the end of the central mixing operation, but in this plant the contractor also has installed a Rex Pumpcrete machine. The concrete when mixed is discharged into an agitator cylinder. This cylinder is mounted so as to be fed by gravity from the Rex mixers. It acts as a surge chamber above a dual duplex set of Rex concrete pumps. These have a capacity of 60 cu. yd. of concrete per hour. The mixed concrete is fed alternately by the pumps into a long radius 7 in. connection into the distributing 7 in. line. No unusual difficulties have been experienced in placing concrete by this means. All of the concrete for the 17-story building (which is 240 ft. high) is to be placed in this manner.



Upper left: Chain drive at the foot of cement elevator to the cross screw conveyor in cement receiving hopper, shown at the right. Center: Cement weighing hopper, with the aggregate weighing hopper at the left and pneumatic gate control at the right behind the post. Upper right: Truck hopper for aggregates and motor driving sand agitator. Lower left: Agitator and two pumps. Right: Aggregate weighing hopper and pneumatically operated gate. Inclined cement screw conveyor from bin to cement batcher

The air supply for the pneumatically-controlled gates is supplied by a separate compressor installed in the ground floor of the plant. All of the units described are individually driven by electric motors, and in most instances by V-belt drives. The main electrical control board is located on the batcher floor level, and is under the direct observation of the operator.

Gypsum Sales Gain

GYPSUM INDUSTRY showed healthy increases in output and sales in the second quarter of 1937 over the corresponding period for 1936, according to quarterly returns compiled by U. S. Bureau of Mines. Crude gypsum and gypsite mined in the United States totalled 897,114 short tons, a gain of 22.3%. Imports of crude rock as reported by operators increased 75.1% and sales of uncalcined gypsum of domestic and foreign origin in the second quarter of 1937 were 13% above the corresponding period in 1936. Calcined gypsum produced from domestic and imported rock amounted to 664,616 tons, an increase of 21.8% over the 1936 period.

Sales of plasterboard and lath rose to 187,896,202 sq. ft. in the second quarter of 1937 and again showed the largest relative gain, 61.6%, of the calcined products reported. Increase in sales of other calcined products varied from 7.9% for partition tile to 26.2% for calcined gypsum sold to potteries, terra cotta plants, plate glass works and for other manufacturing uses. Sales of base coat plasters amounted to 370,568 tons, an increase of 22% over the second quarter of 1936.

Data for the first six months of 1937 show even greater percentage increases over 1936 than were indicated for the second quarter. Crude gypsum mined in the first six months of 1937 totalled 1,503,637 tons, an increase of 38% over that for the first six months of 1936. Imports, as reported by operators, were up 83.1% and calcined gypsum produced and uncalcined gypsum rose 40.8% and 26.5%, respectively, over figures reported for the corresponding period in 1936.

	Jan.-Mar. a 1937	April-June 1936	April-June 1937	Percent of increase in 1937 (second quarter)	Jan.-June 1936	Jan.-June 1937	Percent of increase in 1937 (first half)
Number of active operators	33	40	40	....	41	40	....
Crude gypsum (including gypsite) mined ..... Short tons	606,523	733,729	897,114	22.3	1,089,604	1,503,637	38.0
Crude gypsum imported (as reported by importers) do.	27,853	163,479	286,262	75.1	171,577	314,115	83.1
Uncalcined gypsum and gypsite sold (domestic and imported) do.	148,756	227,330	256,864	13.0	320,668	405,620	26.5
Calcined gypsum produced from domestic and imported rock do.	540,500	545,758	664,616	21.8	856,206	1,205,116	40.8
Calcined gypsum and gypsite products sold from domestic and imported material:							
For pottery, terra cotta, plate glass, mixing plants, etc. do.	51,974	50,252	63,427	26.2	89,086	115,401	29.5
Keene's cement do.	9181	9676	10,563	10.9	15,444	19,744	27.8
Calcined plasters sold:							
Base coat plasters (exclusive of sanded plaster) do.	275,973	303,862	370,568	22.0	465,182	646,541	39.0
Sanded plaster do.	27,669	24,063	28,227	17.3	39,830	55,896	40.3
Gauging, molding and finishing plasters do.	51,577	42,256	48,090	13.8	70,522	99,667	41.3
Plaster board and lath sq. ft.	149,336,631	116,258,854	187,896,202	61.6	174,076,648	337,232,833	93.7
Wall board do.	88,381,674	96,096,540	107,329,529	11.7	156,457,838	195,711,203	25.1
Partition tile do.	4,963,781	3,959,878	4,273,000	7.9	6,675,959	9,236,781	38.4
Roof tile do.	(b)	(b)	(b)	....	(b)	(b)	
Other gypsum tile do.	(b)	(b)	(b)	....	(b)	(b)	
Other calcined gypsum sold Short tons	6720	8548	7805	c 8.7	13,982	14,525	3.9

a Revised.
b Bureau of Mines not at liberty to publish.
c Decrease.

Seven Shapes Comprise New

CONCRETE TONGUE-and-GROOVE UNITS

By I. B. SILLS

SOMETHING NEW IN CONCRETE building units has been developed by I. B. Sills of Tonganoxie, Kan., who has had 30 years' experience in concrete work. Several residences and other types of structures have been built with the new "tongue-and-groove" concrete blocks, and it is claimed that these buildings have proved to be durable, free from dampness, and well insulated. No cracks have appeared since the buildings were erected a year ago.

The "tongue-and-groove" design of the various shapes in which the block is made may be seen in one of the illustrations. As the units interlock with each other by means of the tongue-and-groove construction, no mortar is used. A water-proof cement, applied with a brush, is used in laying up the units in the wall. When it sets and cures in the wall, the cement makes a strong bond, said to be moisture proof. Elimination of the mortar joints leaves a comparatively smooth wall which may be painted or surfaced in any way desired.

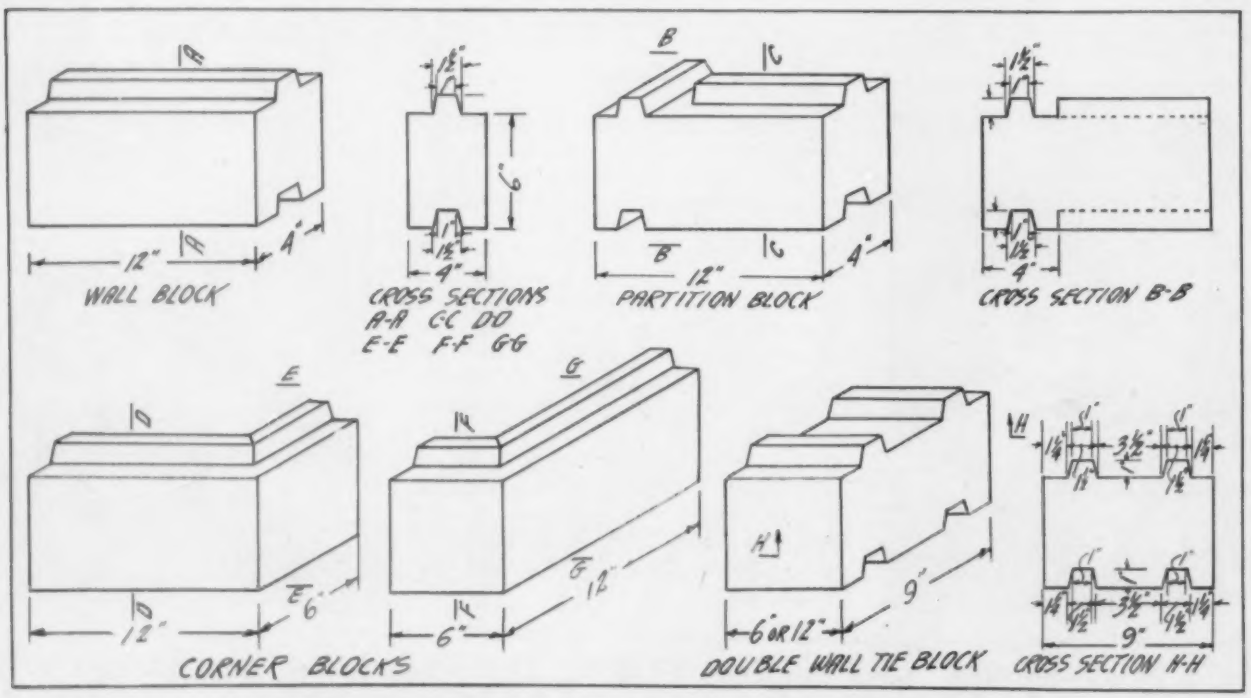
Small house built with the new tongue-and-groove concrete blocks, using inexperienced building labor

Small Labor Cost

Very little labor is required in laying up the walls and partitions with the interlocking units, and skilled workmen are not needed. In fact, the house illustrated was constructed with the interlocking concrete units by the owner, Mr. Delmar E. DeLude of Tonganoxie, Kan., with the aid of a boy helper. Mr. DeLude never had any previous experience in concrete building construction.

Seven shapes of "tongue-and-groove" or interlocking concrete units are available: (1) Base block or water table, bedded on the foundation; (2) Straight wall block; (3) Right and left hand corner blocks; (4) Partition block; (5) Cross, wall or tie block; (6) Cap or finish block for the top of the wall; (7) window sills and lintels.

The base or water table block, laid on the foundation, has as many tongues



Construction details of the new interlocking concrete building units in which no mortar joints appear in the finished wall. Tie blocks and partition blocks interlock the entire building construction

as there are courses of the straight wall blocks. Single walls of 4 in. to 6 in. block have one tongue; double walls, 9 in. to 13 in., have two tongues. Two 4 in. blocks are used in a 9 in. wall with an inch air space between; 13 in. walls have 6 in. blocks with an inch air space.

Straight wall blocks may be made 4, 6 or 8 in. wide, and 12 in. to 16 in. long, and 6 in. to 8 in. high, all tongue-and-groove construction. The tongue is on the top and the groove is on the bottom of the block.

Corner blocks are made either single or double to fit the number of wall corners, and are right or left in order to tie the corners securely to the wall and break joints one-half way.

Cross wall or tie blocks are used to securely hold the double wall construction in place. The tie blocks are spaced in accordance with the length and height of the wall to give maximum strength.

The finishing block for the top of all walls has a smooth top, but with the necessary number of grooves on the bottom to fit down over the tongues of all wall courses. This block is made as wide as the walls and in lengths suitable for convenient laying.

Special Sizes

Partition blocks have a cross tongue and groove at one end of the block and at right angles, lengthwise of the block. The cross groove fits over the inside tongue of the wall and the other groove ties into the partition wall. The partition blocks are laid so that in one course, the block fits over the wall while the block in the second course abuts against the wall.

To hold the roof in place, ½ in. or ¾ in. rods, 6 ft. long, are suspended in the air space and anchored through a tie block at the lower end and secured to the rafters at the top. Special tongue-and-groove concrete units are made for window lintels, sills, and door thresholds to fit into the different wall thicknesses. Chimneys and fireplaces can be built up integrally with the outside walls by using partition and corner blocks combined.

New Concrete Block Plant In Arizona

C. J. WILKERSON, Tucson, Ariz., recently started operations in his new $10,000 concrete block plant at the end of North First avenue. The first cement block was sent to the University of Arizona to be tested. Approximately $7000 in machinery has been installed in the plant building, and a well for water supply has been dug. Blocks are made in 8-x8-x12-in. size. Other sizes which will be made are 4-x8-x12-in., and 8-x12-x12-in. In addition to the block, a concrete French tile will be made for use on roofs. It does not have as much arch as the Spanish tile, but is thicker and each tile interlocks with the other.

Detroit Concrete Demonstration Home

DETROIT CONCRETE PRODUCTS ASSOCIATION, Detroit, Mich., has announced through John J. Scheel, president, that the "1938 Ideal Concrete Demonstration Home" is now being built and will be open to the public in February. The association, composed of 24 concrete products firms, is sponsoring the fabrication of a new type of dwelling to fit the average income of the public. It is said to be the first low-cost concrete demonstration home ever to be built in this territory with both first and second floors constructed with concrete joists and concrete slabs. Arthur H. Hyde, of Hyde & Williams, is the architect.

New Rock Wool Plant At Temple

A NEWS REPORT FROM TEMPLE, TEX., states that plans are under way to start a rock wool plant in this city. Details of the principals, the factory cost, and size have not been revealed, but this information will soon be announced.

Vacuum Concrete Floor Finishes

VACUUM CONCRETE CORP., 30 Rockefeller Plaza, New York, N. Y., has announced a new bulletin, "Vacuum Concrete Floor Finishes", describing the use of the vacuum concrete process which removes all surplus water from concrete, eliminating the possibilities for cracks and shrinkage.

High Early Strength Cement Increases

CURING CAPACITY

By D. S. MAC BRIDE*

Mgr. Incor Division, Lone Star Cement Corp.

EARLY EXPERIENCE with the use of high early strength cement in concrete products manufacture indicated that repetitive casting operations were speeded up. The first products so made were pipe and precast piles. For both of these products early re-use of molds, early handling and high strength concrete are desirable. Since the cement content is high, substantial cost savings are necessary in order to show an over-all economy.

Cast-stone manufacturers also use high early strength cement for the reasons just given, and the additional reason that this type of cement has a higher cementing value. That means a given amount of cement will produce greater strength, particularly at periods up to one year. While cast-stone manufacturers want this higher strength for durability and appearance, other cement users have seen in this property an opportunity to reduce the cement content and still secure sufficient strength.

Because of this we are threatened with an unreasoned competition in the design of mixes based only on strength. While there have been few serious consequences from this mad scramble to use less and less cement, unnecessary chances have been taken.

Control Mix Carefully

The use of high early strength cement in concrete building units has been slow in its development. There are several reasons for this. First, strength requirements are low and as a result mixes are already quite lean. Second, without intelligent mix design the use of premium cement frequently increases over-all material cost. True, there are resulting economies that act as an offset, but unless advantage be taken of greater cementing value, net savings are infrequent.

Experience has shown that high yields cannot be used with safety unless mixes are carefully designed, rigidly controlled and properly cured. It is dangerous to say that any products plant may increase the yield from 20 blocks per bag to 30 blocks per bag merely by changing the type of cement. The 20-block unit may be inferior and the 30-block unit even more so. As a result, such a change would only make a bad matter worse. The only safe approach is on the basis of each individual plant as a separate and distinct problem.

Aggregates should be studied to determine the number of separations that should be made, and the manner in which these separations should be recombined to produce the desired properties, be they strength, density, nailability, lightweight, or early handling. Then these combined aggregates should be mixed with various proportions of high early strength cement, ordinary cement and water, and the resultant properties of the hardened units determined. Study the effect of varying the duration and the conditions of curing upon strength, breakage and length of stock pile storage. Accuracy of control in proportioning, mixing, molding and curing should be determined so that the influence of variations in these details on the finished product may be known.

Increasing Curing Capacity

Many plants are now working at capacity and could handle more business. Manufacturing capacity in most cases is limited by curing chamber capacity. Anything that increases the output of the curing chambers makes possible a corresponding increase in the daily production of the machines.

Due to its chemical composition, high early strength cement reaches a given degree of curing in a materially shorter time. That may mean 12 hours or even eight hours curing will prove as effective as 24 hours. It is obvious, however, that with curing capacity doubled or trebled, production schedules may be correspondingly increased with no change in investment or overhead. In other words, products made on a multiple shift operation basis should be cheaper than those made on a single shift.

Typical Experiences

Typical current experiences from several parts of the country, which follow, illustrate in detail some of the methods used to secure maximum production of quality products.

For example, a New England manufacturer serves an area in which cities require block strengths varying from 700 lb. to 1200 lb. per square inch. This manufacturer makes all of his blocks to meet the highest requirement. The product is a Straub block having about 45 percent air space. To obtain the required strength with ordinary portland cement he used 375 lb. of cinders per bag. With high early strength cement, he is now using 490 lb. resulting in an increased yield of about 30 percent, sufficient to overcome the cost difference in the two cements. A similar yield increase was obtained on his sand and gravel units. Low pressure steam curing for 15 hours was formerly necessary to produce a one day strength of 425 lb. Now with high early strength cement, the units have a one day strength of 650 lb. after but 10 hours curing. While this plant has not gone on to two-shift operation, it is obvious that with a 10-hour release on pallets and cars the same equipment is sufficient for full two-shift operation.

For 3000 unit daily production, 6000 pallets were formerly needed but with

*Abstract of a paper presented before the convention of the National Cinder Concrete Products Assn., Atlantic City—August 2, 1937.

high early strength cement and the same production rate, 3300 pallets are sufficient. This operator finds no difference in the time required on stock piles because sandlime brick competition has forced him to build storage sheds and carry a large stock.

An eastern manufacturer making cinder products changes to high early strength cement in the fall and winter, in order to secure the required strengths within two weeks, using his standard curing procedure and outside stock piles.

A large Ohio producer of limestone aggregate blocks uses a carefully controlled process throughout. Working under a city code requiring 1000 lb. block at 28 days, he has set 1200 lb. as his minimum strength. This meant a yield of 24 block (45 percent air space) using washed limestone sand, ¼-in. maximum size limestone coarse aggregate, and ordinary cement. After experimenting he found that high early strength cement would maintain a 1200 lb. 28-day value with a yield of 33½ block per bag. These block test over 1000 lb. in seven days.

Another Ohio producer uses high early strength cement for all products other than machine made block. These include cinder concrete floor joists, roof and floor slabs and also sills and lintels. Using a 1:5 cement cinder mix, table vibrated, 3-day strengths average 1980 lb. and 28-day values range from 4000 to 4800 lb.

Following a careful examination of aggregates, the design of the mix using three aggregate sizes instead of two, and the change to high early strength cement, a trans-Mississippi manufacturer increased his yield from 20 to 30 block per day. Steam curing decreased from 24 hours to 12 hours, strengths increased from 1100 lb. at 28 days to 1100 lb. at seven days. Material costs decreased ½c per unit. Stock on hand decreased 50 percent, pallet requirements also decreased. In this city there is another plant using these same aggregates to produce concrete joists. By means of a re-design of the mix, six sacks of high early strength cement per cubic yard are now used in place of 7½ sacks. Material costs remain the same. But concrete strengths of over 2500 lb. per square inch are now secured at 3 days. In the absence of test data, it is safe to assume that this same strength was not developed by the former mix in less than two weeks. Joists made with high early strength cement are handled in from 8 to 12 hours after casting; manufacturing capacity has increased with no additional equipment; breakage is greatly reduced; storage time at the plant cut 50 percent and smoother, better looking products secured.

Shrinkage due to drying out should not be overlooked. There is danger that, having the necessary strength, units will be placed in the wall before they have become volume constant. A change in cement does not materially affect the amount of shrinkage due to drying out but may shorten the period over which it occurs. The same care should be exercised to insure delivery of blocks from which excess moisture has been removed as was found necessary with other types of cement.

Conveyor Accident

(*Continued from page 80*)

lated for their own protection should be severely disciplined.

2. *Provide* stiles where it is necessary to cross, with steps and platform supported by floor and not by conveyor box lid. Insist that these stiles be used.

3. Inspect, repair and replace. If you have not included conveyor lids in plant inspections, start now. The Navy divides a ship into sections down to the last square foot and assigns each section to a man who must rigidly inspect it and report every day. He is held strictly accountable for reporting the slightest change, even the tiniest scratch, in his section, for expert attention.

Several years ago Jack Dempster, director of safety of Canada Cement Company, Ltd., said this:

"When you were a little boy do you remember how, while you were watching so intently as your mother turned the handle of a food chopper, you loved to give the crank a twist yourself? You remember how she warned you against getting your fingers in the top of the hopper with the meat! She told you that if you got your hand in there while the crank was being turned, your fingers would be cut off and ground up just as easily as the meat she used. Ever after you showed respect for that meat grinder; you knew what it would do if you were not careful, and you never let it get a chance.

"The only difference between the old meat chopper you have at home and a screw conveyor is that your chopper is turned by hand and can be stopped instantly, but the screw conveyor has a powerful motor turning it and it doesn't stop for small things such as a piece of meat. It is intended to convey, but a man's leg, his arm, his whole body can be drawn into the screw and ground up, *and has been ground up*, exactly the same as your food chopper grinds meat.

"*Watch those conveyors;* take no chances with them; do not leave them uncovered, for no more fiendish, hellish instrument of torture and death has ever been invented."

Buffalo Vault Company Expands

BUFFALO WILBERT VAULT CO., Buffalo, N. Y., has purchased the former Salamanca Panel Co., building in Salamanca, N. Y., which will be used in housing plant facilities for the manufacture of asphalt and concrete vaults by a patented process. This company, which has 105 plants located throughout the country, will build burial vaults in the Salamanca plant for sale in the Jamestown-Olean-Bradford area. Twelve men will be employed in the factory for the initial operations.

Ready Mix Plant for Logansport, Ind.

THE TRANSIT MIXED CONCRETE CORP., Logansport, Ind., has started operation from its new plant at North Third street and the Pennsylvania Railroad tracks. John A. De Grief, president and general manager of the new firm, was formerly with the San-Gra Stone Co., a sand and gravel concern. The Transit Mixed Concrete Corporation will operate trucks equipped with motor-driven cement mixers. Sand, gravel, and cement is mixed in accordance with specifications and delivered directly to the job.

Silica Industry Growing In California

THE EMSCO REFRACTORIES, INC., Los Angeles, Calif., recently acquired a group of silica claims one mile south of route U. S. 60, and five miles west of Quartzsite. A seven-man crew is engaged in mining the rock, and dump trucks are busy hauling loads to Blythe, Calif., for shipment to the company's plant in Los Angeles. The silica deposit near Quartzsite is said to run about 95 percent pure. Formerly, the company obtained its silica supplies near Victorville but since the new deposits are superior in quality the old claims have been abandoned.

Concrete Pavement Yardage

Awards of concrete pavement for September, 1937, have been announced by the Portland Cement Association as follows:

Type of Construction	Sq. yd. awarded during Sept. 1937	Total sq. yd. for year to date Oct. 2, 1937
Roads	4,499,085	32,643,736
Streets	1,509,269	10,617,377
Alleys	50,339	429,705
Total	6,058,693	43,690,818

RHODE ISLAND CONCRETE PIPE CO., Providence, R. I., recently suffered a loss of records and other equipment when a fire recently damaged its office building at 365 Charles street.

CONCRETE JOISTS

Lead to Profits at Low Cost

The sweeping demand for concrete joists by builders requiring permanent, fireproof construction has created a highly profitable opportunity for concrete products manufacturers.

The Vibrating Table with 10 gang Joist Mold illustrated above will enable you to dominate the building market in your locality with Precast Concrete Joists.

Amazing profits possible with only limited investment.

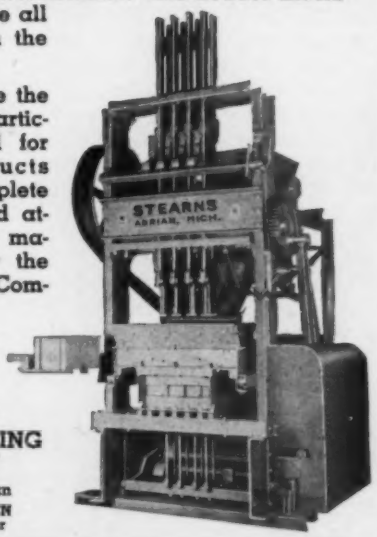
Write for complete details today.

R&L CONCRETE MACHINERY CO.

KENDALLVILLE, IND.

More Blocks per Bag of Cement!

The long drop, heavy double bar, alternate tamping action found only on the Stearns Power Stripper produces stronger concrete units (units without vertical lines of lesser density)—a bag of cement goes further. And it's fast too—no other machine makes as many blocks per man. Plain and rockface, manhole and header block, brick and tile are all easily made on the same machine.



We also make the Stearns Mixer particularly designed for concrete products plants and complete repair parts and attachments for machines built by the former Anchor Company.

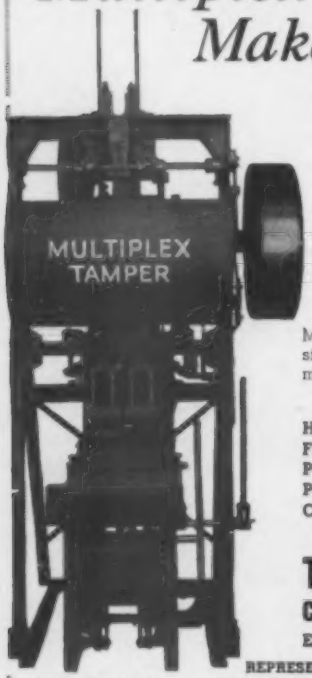
Write today for bulletins.

STEARNS MANUFACTURING COMPANY

Adrian, Michigan

EUGENE F. OLSEN
General Manager

Multiplex Products Make Satisfied Customers



MULTIPLEX satisfies the users of our equipment and the buyers of their products. True units are in demand and we have pleased thousands; why not let us prove to you that we can improve your plant and products with MULTIPLEX machines for any size block or production requirement.

—o—

Hand or Power Press Strippers
Flue Block Machines in all sizes
Power Tampers
Power Strippers
Cars, Elevators, or a complete plant installation

The MULTIPLEX CONCRETE MACHINERY CO.

ELMORE . . . . . OHIO

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H. W. Remington, New York City
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C. S. Robinson, Empire Bldg., Birmingham, Ala.
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CORED STEEL PALLETS

Should be specified when new equipment is purchased or old equipment is being replaced

BECAUSE

"Commercial" Cored Pallets are light in weight, easy to handle, less muscular energy is required in a day's work, and this means something to labor these days.

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Blocks cure quicker and more uniformly.
Cored Pallets can be used on low cost machines.
Less Block breakage and NO pallet breakage.
Neither will they crack or warp.
Cored Steel pallets are a permanent asset.
Specify Commercial Steel Pallets for BETTER BLOCKS AND LOWER COSTS.

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We make many sizes and styles of pallet Catalog will be mailed on request

The COMMERCIAL SHEARING & STAMPING COMPANY
YOUNGSTOWN, OHIO.

Special Equipment Used In

PRECASTING WORLD'S LARGEST PIPE

By JOHN R. MARCY

THE LARGEST CONCRETE PIPE ever made is now being used on the main distribution line of the Colorado River Aqueduct near Upland, Calif. Its manufacture called for the development of totally new equipment and many new processes.

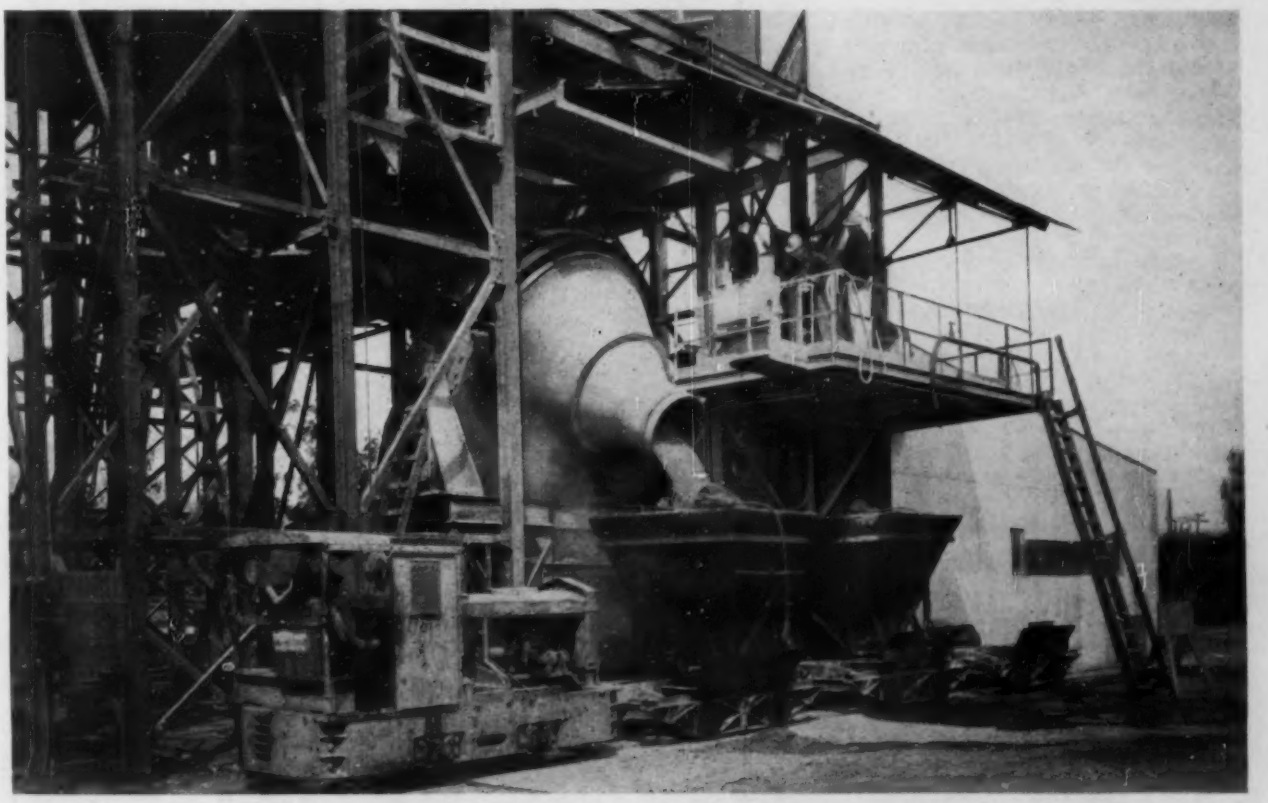
To meet the production requirements for 16 miles of pipe, the American Concrete and Steel Pipe Co., of Los Angeles, found it necessary to set up a complete new fabrication plant at a cost of about $250,000. Practically all of the equipment has been designed and constructed in the company's shops, and some of it has been patented. The plant's daily schedule of 16 of the giant sections requires about 325 cu. yd. of concrete and 40 tons of reinforcing steel.

Pipe sections are made in 12-ft. lengths, 13 in. thick, with an inside diameter of 12 ft. 8 in. Each section contains 20½ cu. yd. of concrete and 2½ tons of steel, the whole weighing 43 tons.

Special Machine Winds Pipe Reinforcing Steel

Two layers of steel reinforcement are used in each section, an inner circular system and an outer elliptical layer. These are wound in continuous spirals into the assembly and welded to longitudinal rods. The cages are wound on a specially designed machine which gives any desired spacing to the windings, according to the speed of the winding drum. Six-foot coils of steel are fed through a machine which travels at a fixed rate along the side of the drum and unwinds the steel at a rate corresponding to the turning of the cage. When completed, the cage is picked up by a gantry crane and set on end, ready for placing in the forms.

The pipe sections are cast vertically in forms, consisting of inner and outer jackets and bottom and top rings. The



Batching plant for manufacture of precast concrete pipe which will be used in the main distribution line of the Colorado River Aqueduct. A 4-yd. Mixer discharges concrete to 2-yd. cars which are lifted by crane to the pouring hopper

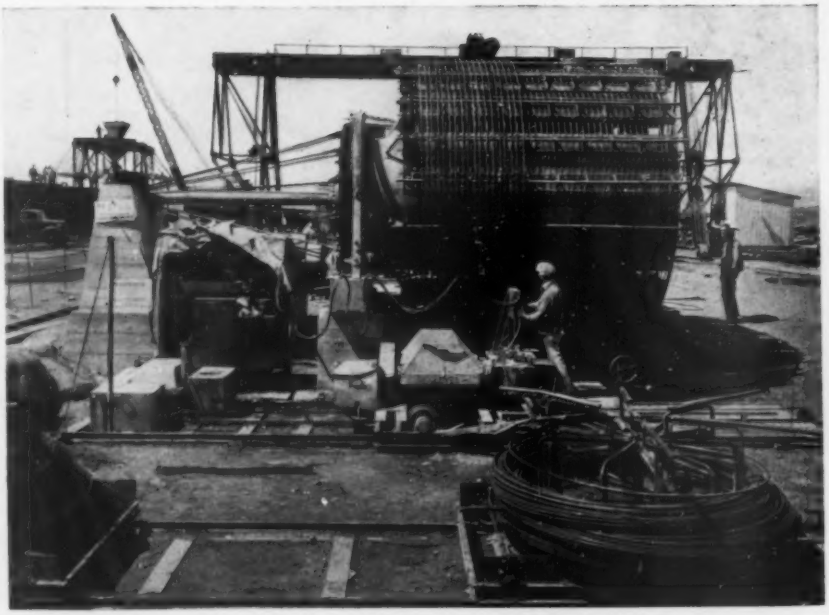
inner form has a small collapsible section of inflated firehose with 2¾ in. of contraction to facilitate removal. Setting permanently in concrete in a single line along the side of a track are 48 steel bottom rings, an arrangement which makes continuous pouring possible, for each section must stand for 72 hours before being moved, and since 16 sections is the plant's daily capacity, the first day's pouring has stood the required time when the cycle is complete.

The concrete mixing plant is of the most modern design. Aggregate is trucked from commercial producers and elevated to bins over the batchers to provide gravity feed. All material is batched by weight, the scales being provided with electric eyes and interlocking mechanisms to insure accuracy. A 4-yd. mixer empties into 2 yd. bucket cars on tracks.

External Pipe Vibrators

These buckets are lifted by a crane and emptied into the hopper of the pouring gantry. As the concrete rises in the form, three external type vibrators are used on the outside form. This system of external vibration, developed by the company, is undoubtedly one of the most important and unusual features of the pipe casting.

Long square steel rods are rotated and vibrated for about 20 minutes along the inside of the forms at 700 r.p.m. by means of small air-operated motors. This results in practically eliminating air and water pockets, a thorough compacting of the concrete, and a great reduction in surface defects.



Winding the steel reinforcement for the pipe with a special machine which takes ¾-in. rod from a coil shown in the foreground

After a section is completed, steam from underground lines is introduced on the inside of the pipe. This curing continues during the night, the temperature of the whole section being raised to about 100 deg. F. The outside form is then removed, and the section left standing on the base ring. A coal-tar curing compound is immediately applied, followed by a coat of whitewash.

After standing for a total of 72 hours, a system of steel braces is placed inside the section, the gantry tips it to a horizontal position, and it is rolled into the storing yard. Here it is water cured for 12 days by a clock-controlled sprinkling device which provides a 15-second sprinkling period every 20 minutes.

The pipe is hauled in 50-ton trailers to the ditch where a sling is placed around the section, and it is lifted and placed by a 48-ft. straddling gantry. Joints are mortared and rodded, and a backfill concrete cradle to support the bottom is poured.

H. H. Jenkins, vice-president of the American Concrete and Steel Pipe Co., is in general charge of the construction work, and W. A. Whiting is general superintendent. Donald Rankin is superintendent of the fabrication plant, and J. S. McConnell is in charge of installation operations.

Gantry crane lifting and turning large pipe section protected with steel braces. Concrete is poured through the conical chute shown suspended from the top of the gantry

Wage Agreement Made By Cement Plant

SPOKANE PORTLAND CEMENT CO., Irvin, Wash., has announced a wage agreement with the A. F. of L. cement workers' local, providing for an increase of eight cents an hour and a minimum scale of 58 cents an hour.

Project Completed Plant Closes

ALPHA PORTLAND CEMENT CO., Rowlesburg, W. Va., plant has been closed for an indefinite period, according to local reports. This plant furnished a large part of the cement used in the $18,000,000 Tygarts Valley flood control dam at Grafton.

New MACHINERY & EQUIPMENT

Low Voltage Linestarters

WESTINGHOUSE ELECTRIC & MANUFACTURING CO., E. Pittsburgh, Penn., has announced a new totally oil-immersed linestarter, known as low voltage type DNO, for explosion-proof and corrosion resisting service. This new linestarter was designed for starting squirrel cage motors in cement mills, and in similar applications where either corrosive or explosive gases may be present. The

Oil-immersed, linestarter for explosion-proof and corrosion-resisting service

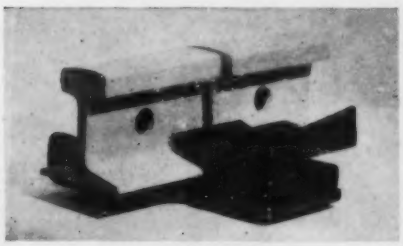
combination starters provide in one oil tank, complete corrosion-resisting motor control, motor disconnect switch and circuit protective device. They are adaptable for wall or frame mounting, with tapped holes for conduits on top. Ends and back of top casting may be tapped for conduit. Overload protection is provided by two thermal induction oil-immersed automatic reset overload relays. Low voltage protection is obtained with three-wire push button control. Safety is assured by interlocking breaker handle with the tank so that the latter cannot be lowered unless the breaker handle is in the "off" position. Furthermore, the breaker cannot be closed with tank lowered unless the interlock is deliberately tripped. In addition to the breaker and starter combination unit described above, there is also available a combination unit with non-automatic disconnect switch and a plain starter without disconnect.

THE HIPPLE LABORATORIES, Temple, Penn., announces HILAB, a patented dressing for all types of belt, that is said to be new and different from any other dressing now on the market. The dressing, besides serving as a belt preservative, has been developed for use in very dusty conditions to prevent slippage. HILAB is available in ½-, 1- and 5-gal. drums.

Rail Splicer For Temporary Tracks

PORTABLE LAMP & EQUIPMENT CO., Pittsburgh, Penn., is now producing a rail splicer for temporary tracks laid in stone and lime quarries. This splicer eliminates the use of fish plates, bolts, and nuts, and embodies several features which offer definite advantages. Ease and speed of applying is accomplished by reason of its special design.

The splicer is made in three parts, the main section, wedge plate and wedge. The main section fits under, and flush against the inside of the rails being joined. Two lugs on this part engage the rail holes, and the plate which is held in place by a wedge, locks the



No fish plates are required with new rail splicer for temporary tracks laid in quarries

splicer against the outside section of rails, and against the rail flange thus bringing the splicer in direct contact with three sides of the joined rail.

Four Wheel Scraper Easily Maneuvered

BUCYRUS-ERIE CO., South Milwaukee, Wis., has brought out a new four wheel scraper for the excavating field. Using a three point suspension, and with ample clearance to swivel the front wheels under the frame, this scraper can be maneuvered in short, sharp turns, making a complete circle within the radius of its own length. Because all four wheels are inside the path of the cutting edge, it digs full width in close quarters, and cuts right up against the bank or other obstructions. The dumping action is simple, fast, and positive. The bowl backs away and tilts forward sharply, while the apron tips and slides ahead—both to an almost perpendicular position. A "double-curve" cutting edge is constructed to deliver a combined shearing cut and scooping action. The dirt boils up inside the bowl, funneling up into a full heaping load. In spreading, the scraper blade is used to level off the dump, resulting in an even, accurate spread of the dirt. The Bucyrus-Erie four-wheel scraper is regulated by an easy-running, single cable operating over a minimum number of sheaves from the drum power unit on the tractor. One control lever, conveniently placed, gives the operator instant and positive control of his loading, hauling, dumping, and spreading operations. The scraper is manufactured in two sizes, 4½-yd. capacity and 7-yd. capacity level measure.

Outdoor Cable Terminator

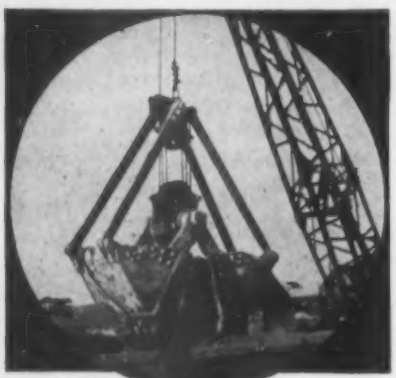
DELTA STAR ELECTRIC CO., Chicago, Ill., has announced an improved three-conductor terminator. Used on a 27 k.v., 500 amp. cable, it is rated 34.5 k.v., and has an 18-in. striking distance between phases at the porcelain bushings. The body is of high strength aluminum alloy,

Three-conductor cable terminator is rated at 34.5 k.v. on a 27 k.v., 500 amp. cable

so designed that the amount of filling compound is a minimum, giving low shrinkage effect.

Separately mounted wet process porcelain bushings permit field replacement without disturbing other bushings. Cemented joints are absent and no current is carried through threaded joints. Vacuum and water tight, they may be oil or compound filled. An inverted type wiping sleeve entrance is supplied, permitting the use of a wiped cable joint with the terminator mounted on conduit.

(*Continued on page 99*)



THE INDUSTRY

New Incorporations

Tacoma Gravel and Supply Co., Tacoma, Wash., $10,000 to deal in building materials. P. H. Bowman, Harold Stauffer and Jay M. Webb, incorporators.

Cotton State Portland Cement Co., Jackson, Miss., was formed for the purpose of manufacture, buying, selling and dealing in cement of all kinds, lime, limestone, plaster and natural and artificial stone with a capital stock of $1,500,000—90,000 shares non par stock common 36,000 shares 6 percent preferred at $50 per share. Incorporators are: W. Horace Williams, 833 Howard Ave., New Orleans, La.; C. L. Till, Jackson, Miss.; Charles A. Till, Fayette, Miss.; C. E. Robbs, Leland, Miss.; Gus B. Grover, N. Atchez, Miss.; Evon A. Ford, Taylorsville, Miss.; W. T. Wynn, Greenville, Miss., and A. G. Deer, Jackson, Miss.

Eastern Feldspar & Mining Assn., Inc., Boston, Mass., and Phippsburg, Me. Incorporated for the sum of $50,000—2000 preferred shares at $20 each and 1250 common shares par value $8. Officers are President William L. Adams; treasurer, H. Elliott Johnson; clerk, Robert Gurnett.

Arkhola Sand and Gravel Co., Arkansas, Okla. Incorporated by Katherine Manton, 211 State Capitol Bldg., Oklahoma City for $10,000.

Walker Cement Products Co., 84 Washington St., Hoboken, N. J., Isidore H. Brand, Agent. Capital stock of 3500 no par value shares authorized. Incorporators all of 84 Washington St., are: I. H. Brand, eight shares; H. Verdicchio and H. E. Pierson, one share each.

Republic Portland Cement Co., San Antonio, Texas, has changed its name to Longhorn Portland Cement Co. same address.

Kokomo Ready Mixed Concrete Corp., 1217 S. Washington St., Kokomo, Ind, resident agent C. W. Botts. Incorporated to manufacture concrete and building and paving materials by C. W. Botts, Mary Belle Botts and John W. Botts with a capital stock of 100 shares no par value.

Steel Protection and Chemical Co., 305 Merchants National Bank Bldg., Indianapolis, Ind. Lorlys R. Rogers, Esther J. Rogers and Howard P. Travis are the incorporators, Howard P. Travis is the company's resident agent and his address is 1003 Railway Exchange Bldg., Indianapolis. Capital stock 450 shares preferred of $100 par value and 1000 shares common stock no par value. To manufacture tar, asphalt, cement and allied products.

Green Brothers Gravel Co., Lexington, Miss., has been dissolved as a partnership and become an incorporation retaining the established name and adding the Incorporate. The officers of the corporation are John B. Green, president, H. G. Ladouceur, secretary and Heyward Green, treasurer.

Personals

Dr. H. Foster Bain, who has recently been in China and Japan, has returned to Manila where he can be reached at the Manila Hotel. Dr. Bain will spend much of the coming year in the Far East acting as Advisor on Mining to the Commonwealth of the Philippines.

Alton J. Black was made a vice-president and a technical director of Cementos Atoyac, S. A. He will continue in his capacity as chemical director for the Cement Process Corp., for whom he made a visit to this country.

D. R. Collins, better known as "Spec" Collins lately assistant to the director of promotion of the Portland Cement Association and formerly assistant secretary of the National Concrete Masonry Association, has resigned his position with the P. C. A. to become associated with The Buchen Co., Chicago, Ill.

Mr. M. I. Dorfan, former dust division manager of Blaw-Knox Co., Pittsburgh, Penn., has been reemployed by the Pangborn Corp., Hagerstown, Md., under the title of Dust Control Specialist.

John Howe Hall has resigned as technical assistant to the president of Taylor Wharton Iron & Steel Co., High Bridge, N. J., to engage in private practice as a consulting engineer and metallurgist at High Bridge, N. J.

Charles F. Lewis, plant manager of the Volunteer Portland Cement Co., Knoxville, Tenn., has gone to Puerto Rico to supervise the installation of a government cement plant there. He is expected to return shortly.

O. N. Lindahl, director Chicago Chapter, Controllers Institute of America and comptroller and secretary Universal Atlas Cement Co., presided at the annual national meeting of the Institute in New York, October 4.

Albert H. Schaefer, Rahway, N. J., assistant secretary of the Lawrence Portland Cement Co., New York, N. Y., was elected State vice councilor of the Junior Order of American Mechanics at the organization's convention in Atlantic City, N. J., on October 14. He was previously state council conductor.

W. J. Stewart, vice president of the Marblehead Lime Co., 1220 R. A. Long Building, Kansas City, Mo., has retired from active service after thirty-five years of service with the company.

P. E. Roberts is the new works manager of the United States Gypsum Company's

plant in Greenville, Miss. Mr. Roberts came from Lisbon Falls, Maine, where he held a similar position with the company.

Obituaries

George F. Coffin, Sr., secretary-treasurer and general manager of the Nazareth Portland Cement Co. and former president of the Cement Institute, died October 25 in his home at Nazareth, Penn. He was 67.

Mr. Coffin was a graduate from Lafayette College in the class of '94. He studied law and was admitted to the bar in 1896. He was appointed one of the original referees in bankruptcy in 1898 and held that position in Easton until his death. Outside of his bankruptcy work he was never active in the practice of law. He took an early interest in the cement industry and served several terms as a member of the board of directors of the Portland Cement Association.

Alfred Milton Luttrell, 57, of Brooksville, Fla., Consolidated Rock Products Co. superintendent for the past 11 years, died October 15 at a Tampa hospital.

Percy C. Brooks, former executive vice-president of Fairbanks Morse & Co., died at his home in Chicago, Ill., October 15 after a lingering illness of about a year. He was 65.

Colonel Clarence R. Falk, secretary and treasurer, The Falk Corp., Milwaukee, Wis., who has lived a very varied life, died in early October. Born in Milwaukee, he began his business career in the Savings Department of the First Wisconsin National Bank. Later he became dramatic critic for one of the daily papers. He was then identified with the Cloos Electrical Engineering Co., and in 1901 became associated with the Falk Corp., where he served in various capacities. He entered the World War as a Captain and remained in service until the end of the war when he became a Lieutenant Colonel.

Hugh O'Connor, president, Michigan Wire Cloth Co., Detroit, Mich., died last July 17 at the age of 74.

Charles B. Casten, 48, vice president of the Clear Lake Sand and Gravel Co., died while at work on top of a 25-ft. scaffold and inspecting a pulley box.

Bert G. Hoadley, 61, pioneer limestone quarry owner at Eagle River, Wis., died of a heart attack on September 12 in Bloomington, Ind.

Crushed Stone

Junction City, Kan.: Geary county commissioners have purchased a new rock crusher and a highway maintainer on a rental basis. Capacity of the crusher is ten tons of stone per hour.

Rockford, Ill.: The city street committee has approved a five year lease at $500 a year for the quarry on Horsman street. About 5000 cu. yd. of stone will be produced annually, with the payments applying on the eventual purchase price of $10,000 for the quarry.

Traer, Iowa: Tama county board of supervisors has opened one of its three quarries and is now in operation with WPA labor.

Osceola, Mo.: Maynard C. Hunt and Harold Bullard have installed a new power unit and compressor in their quarry. The owners are trucking chat, crushed stone and agstone and plan to ship flux in the near future.

Newton, N. C.: A WPA grant of $8380 has been approved for the city's rock quarry project. Stone is being used for surfacing of city streets.

Des Moines, Iowa: The city has purchased a rock crusher and is preparing for the first time to crush its own rock for street improvement projects.

Manufacturers

Chicago Pneumatic Tool Co., Chicago, Ill., announces the opening of a direct factory sales and service branch at 119 West Second South, Salt Lake City, Utah. Mr. Otto A. Ray has been appointed manager.

Worthington Pump and Machinery Corp., Harrison, N. J., has announced through President H. C. Beaver that unfilled orders were at the highest level in 17 years, and the number of corporation employes was greater than at any other time during the past 10 years.

Hardinge Co., Inc., York, Penn., has announced the return of Harlowe Hardinge, vice president and general manager, from an extended trip to the West, Canada and northern and eastern parts of the United States. He attended the American Mining Congress in Salt Lake City where he was met by Managers G. A. Wallerstedt and T. B. H. Askin, of the Hardinge offices in San Francisco and Denver, respectively.

Marion Steam Shovel Co., Marion, Ohio, reports that John P. Courtright has been made sales manager with headquarters at the general office in Marion. He has been succeeded by Mr. Steward as district manager at Chicago, Ill.

Link-Belt Co., Chicago, Ill., at the last quarterly meeting elected William C. Carter and Edward J. Burnell as vice presidents. Mr. Carter, a mechanical engineering graduate of the University of Illinois, joined the Link-Belt organization in 1902, and has served his company in important official capacities. Before his recent promotion, Mr. Carter was in charge of company production. Mr. Burnell, a graduate in mechanical engineering of Lehigh University, entered the service of the Link-Belt Co. in 1913. He has been active in the sales organization, and his most recent position was general sales manager of the western division territory with headquarters in Chicago, and more recently general manager of the Pershing Road Chicago plant.

The Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., Passaic, N. J., was awarded honorable mention for their industrial trade paper advertising at the annual convention of the National Industrial Advertisers Association held in Chicago.

Autoclave Test

American Society for Testing Materials has sent to all members of Committee C-7 on Lime a communication from W. C. Hanna, chief chemist and chemical engineer for the California Portland Cement Co., on the Autoclave method of testing for soundness of lime. Members have been advised that December 1 has been fixed as the deadline for submitting data on this subject. Mr. Hanna's letter is quoted:

"We do not believe that the autoclave test should be abandoned as we have found it to be a valuable tool in protecting the quality of our products. We believe the test should be modified so as to remove variables. The amount of water used in making the pat mixture and the manner of mixing the pat should be rightly specified as we have found these factors have a direct bearing on the results of the autoclave test.

"We also question the necessity of running the autoclave test at such a high pressure as 120 lb. per sq. in. If the test were carried out at a lower pressure the rate of hydration of magnesia would be lower. If damaging expansion is a function of too high a rate of hydration of magnesia a proper reduction of this rate would be a step in the right direction."

Prices Bid—Contracts Let

LINCOLN, ILL.: Lincoln Sand and Gravel Co. has been awarded a contract for graveling one mile of road on a state-aid route north of Latham, Ill. The bid was $1.88 per cu. yd.

BERKLEY, CALIF.: State Procurement Office, U. S. Treasury Department, awarded contract for 9000 tons crusher run rock delivered at Wildcat Canyon Road to the Hutchinson Co., Oakland, Calif. at $1.80 a ton.

SAN FRANCISCO, CALIF.: United States Engineers accepted bid of Consumers Rock and Cement Co., San Francisco, Calif., to furnish 10,000 cu. yd. ready-mixed concrete at $7.70 a cu. yd. Concrete is to be used in constructing seacoast defenses at Fort Funston.

MENDOTA, ILL.: Western Sand and Gravel Co., Spring Valley, Ill., was recently awarded the contract for black topping Meridian St. at a bid of $2207.77.

LOS ANGELES, CALIF.: Prices of sand and gravel in the Los Angeles trade area were advanced 5c per ton to a base of 55c at the plant, effective October 1. Present prices are the lowest in years.

Statement of the Ownership, Management, Circulation, Etc., Required by the Act of Congress of March 3, 1933.

Of Rock Products, published monthly at Chicago, Illinois, for October 1, 1937.

State of Illinois, County of Cook, ss.

Before me, a notary public in and for the State and county aforesaid, personally appeared Geo. C. Williams, who, having been duly sworn according to law, deposes and says that he is the business manager of the Rock Products and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher — Tradepress Publishing Corporation, 205 W. Wacker Drive, Chicago, Ill.

Editor—Nathan C. Rockwood, 205 W. Wacker Drive, Chicago, Ill.

Managing Editor—Ralph S. Torgerson, 205 W. Wacker Drive, Chicago, Ill.

Business Manager—George C. Williams, 205 W. Wacker Drive, Chicago, Ill.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.)

Tradepress Publishing Corporation, 205 W. Wacker Drive, Chicago, Ill.

Nathan C. Rockwood, 219 N. Columbia St., Naperville, Ill.

Julius L. Frazier, 2043 Orrington Ave., Evanston, Ill.

MacLean Publishing Company, 481 University Ave., Toronto, 2, Canada.

Col. J. B. Maclean, 7 Austin Terrace, Toronto, Canada.

Horace T. Hunter, 120 Inglewood Drive, Toronto, Canada.

Herbert V. Tyrrell, 221 Dunvegan Road, Toronto, Canada.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.)

None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the twelve months preceding the date shown above is: (This information is required from daily publications only.)

GEO. C. WILLIAMS,
Business Manager.

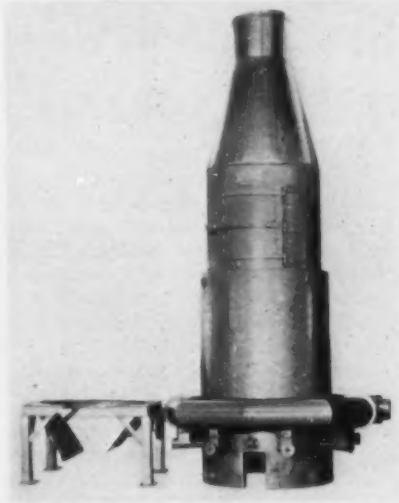
Sworn to and subscribed before me this 22nd day of September, 1937.

(Seal) FLORENCE L. PRINCE.

(My commission expires May 14, 1940.)

Rock Wool Cupola

SUPERIOR BODY CO., INC., Marion, Ind., has designed and is now marketing a cupola used quite extensively in Indiana in the process of rock wool manufacture by utilizing a coke fire. The illustration shows a rock wool cupola made for a company operating in Indiana.



Cupola used in the manufacture of rock wool, utilizing a coke fire

When in operation, the cupola sets on a stand, shown in the illustration, and a 20-ft. smoke stack is placed on top of the cupola. The stand is 3 ft. high; the cupola proper, 8 ft. high; charging dome, 4 ft. high; tapered dome, 5 ft. high; stack connection, 2 ft. high; 20 ft. of stack, making a total height of 42 ft. for the installation.

In this unit, rock wool is manufactured by melting a certain type of Indiana limestone in a coke fire, similar in principle to the method of melting grey iron in a coke-fired cupola.

New Drill

KEYSTONE DRILLER CO., Beaver Falls, Penn., is now in production on the Model 80 series, all-steel drills. It is designed for full crawler traction, non-traction wheel, skid or for truck mounting. Cable reel capacity is 1900 ft. ⅞ in.; 2650 ft. ¾ in.; or 3800 ft. ⅝ in.; wire drill cable on storage side of main drum. The cable reel is equipped with a double "V" brake of high efficiency. The sand reel capacity is as follows: 1150 ft. 9/16 in.; 1450 ft. ½ in.; 1850 ft. 7/16 in.; or 2500 ft. ⅜ in. wire line on working side of divider. On storage side the capacity is: 3050 ft. 9/16 in.; 3870 ft. ½ in.; 5000 ft. 7/16 in.; or 6800 ft. ⅜ in. wire line. Sand reel is chain driven through friction clutch.

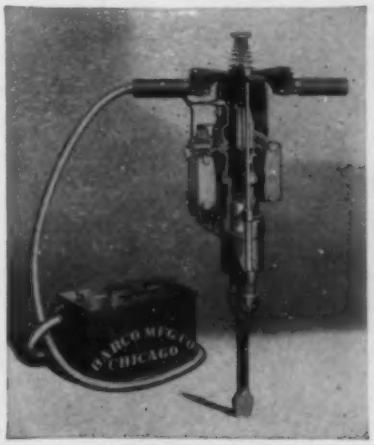
Steel drill, designed for full crawler traction, non-traction wheel, skid or for truck mounting

Fine selective adjustments are provided for pitmans to walking beams. The derrick is a heavy duty oil field design with a crown pulley, calf pulley and sand line pulley. To the center of the crown pulley, the standard length of the derrick is 45 ft. The casing reel is mounted on the front posts, and is powered from the crank shaft through heavy roller chain. Easy handling is afforded by a brake wheel 20 in. in diameter with a 5 in. face.

At an engine speed of 1455 r.p.m., the sand line speed is 310 ft. on an empty drum to 950 ft. per minute on a full drum. The drilling line speed is from 130 f.p.m. on an empty drum to 438 f.p.m. on a full drum. Power may be furnished by gasoline or Diesel engines or electric motor.

Portable Gasoline Hammers

BARCO MANUFACTURING CO., Chicago, Ill., has developed two new portable gasoline hammer models; one known as the H-6 heavy duty type, weight 89 lb., the other Model J-2, weighing about 70 lb. Changes incorporated in the new models consist of a new timing device and rearrangement of the bottom end. The tie rod springs have been eliminated and in place of them an internal cushion spring is used. When lifting the hammer for a new location, this spring takes the shock of the blow, materially reducing the impact shock to other parts. The changes also result in giving the hammer slightly more power and reducing the vibration somewhat. A new quick acting lock for the tool is another of the features, and various other minor improvements have been incorporated. The heavy duty, Model H-6, is recommended for pavement and rock breaking, shallow drilling, backfill tamping, asphalt cutting, sheeting driving and general demolition work. The small Model J-2 has been developed for continuous drilling, and with it there is available a complete set-up including a small portable compressor for ease in transportation to the interior and other inaccessible locations.



Gasoline-operated portable hammer has new timing device

Two-Stage Pump For Limited Space

FAIRBANKS, MORSE & CO., Chicago, Ill., has developed a two-stage built-together pump (pump and motor built together)

Two-stage pump operates against heads up to 500 ft.

to operate against heads up to 500 ft. In many applications it offers a less expensive alternative for multi-stage and split-case pumps, and its compactness and sturdiness qualify it for portable and semi-portable as well as stationary service. The new pump is well adapted for all classes of general pumping service with liquids low in viscosity and free from excessive foreign matter. Because of its compact design, the pump is especially advantageous where space is limited. No special foundation is required; the pump is complete in itself.

Furnace Bonding Mortar

HARBISON-WALKER REFRACTORIES CO., Pittsburgh, Penn., is now producing an improved Harwaco Bond, or high temperature bonding mortar, said to have better refractory and working qualities. The improved product has a pyrometric cone equivalent of Cone 32 (3092 deg. F). Use of this diaspore-base bonding mortar in place of mortar, consisting essentially of fire clay, is reported to be increasing for laying fireclay, super-duty fireclay, and high-alumina brick where a strong bond must be maintained at the upper limits of industrial furnace operating temperatures.

IT'S COMING

THE 1938

Annual Illustrated Review and Directory Number!

The January issue of ROCK PRODUCTS will be a comprehensive digest of recent improvements of Processing in the Rock Products Industry. The following departments will be completely covered: Excavation and Conveying, including use of Explosives; Screening and Washing; Crushing; Grinding; Separation and Classification; Combustion Devices and Heat Recovery; Power—Diesel, electric, etc., including transmission devices; Manufacturing Controls; and Packing, Shipping and Merchandising.

Also included will be a complete directory of all the manufacturers who make the equipment and supplies used in the industrial minerals field.

This issue will be the most helpful one yet published—helpful to the reader, the machinery and equipment manufacturer, the advertiser. No matter what classification you come under YOU CAN'T AFFORD TO MISS IT.

CASH *for Your Ideas*

$150.00 in Prizes

OPEN TO SUPERINTENDENTS AND PLANT OPERATING MEN

First Prize	$50.00	Second Prize ..	$40.00
Third Prize	30.00	Fourth Prize ...	20.00
Fifth Prize	$10.00		

It's Easy to Enter

Just send in your ideas on novel operating methods, short cuts or time savers which you have used during 1937. Write just enough to intelligently explain the subject. Use pen, pencil or typewriter. If possible illustrate with photograph, blue print or sketch. Articles will be judged primarily on the excellence of the idea and not on literary merit.

All Articles Used Will Be Paid For .....

Any Article submitted and found suitable for publication will be paid for at space rates of $5.00 per column of ROCK PRODUCTS, including illustrations.

This offer is open to all operating men in the industry, whether subscribers to ROCK PRODUCTS or not.

ROCK PRODUCTS
205 W. WACKER DRIVE
CHICAGO, ILLINOIS

About this Question of Federal Legislation

What Can The Sand and Gravel and Ready Mixed Concrete Industries Expect As to The

Black-Connery Wage and Hour Bill?

Will this bill pass at the special or regular session? How seriously will it affect wages and hours and labor conditions in the industries? Will its operation influence labor costs in 1938?

Labor Disputes Act?

What effect has this law had on labor relationships in the industries? Does the law really cover the industries? Will it be amended at the next session?

Federal Tax Laws?

Has the surtax on undistributed corporate profits retarded the industrial building market? Does the law operate unfairly on small companies and those with debt retirement obligations? Will it undergo drastic revision at the next Congress?

Federal-aid For Highways?

Will Congress renew the regular Federal-aid highway program for the calendar years 1939 and 1940? Does the Administration look with favor on this type of Federal expenditure? What part has the Federal Government played in the development of the highway program?

Federal Anti-trust Laws?

What is the policy of the Administration toward anti-trust law enforcement? Will there be a drastic revision of these laws at the next session? What is the attitude of Congress toward the basing point and delivered price systems?

W.P.A.?

To what extent has the W.P.A. program increased the number of governmental plants? Will the demand for budgetary retrenchment produce a curtailed W.P.A. program in 1938? What effect has this program had on industrial employment?

These and other questions will be discussed at the

Twenty-second Annual Convention and Exposition

NATIONAL SAND AND GRAVEL ASSOCIATION

Eighth Annual Convention and Exposition

NATIONAL READY-MIXED CONCRETE ASSOCIATION

NETHERLAND PLAZA HOTEL • CINCINNATI, OHIO

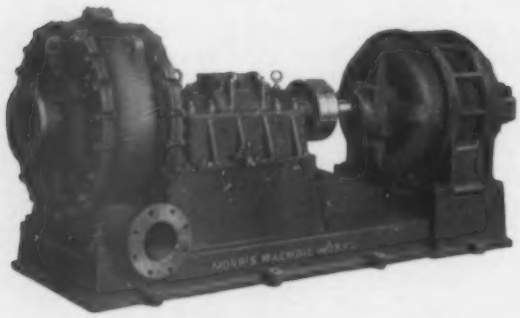
January 31, February 1, 2 and 3, 1938

The MORRIS HYDRAULIC COLUMN

News of interest to Centrifugal Pump Users

A "pocket size" dredge

The 30-ft. dredge illustrated above will not quite fit into its owner's pocket but it is ideally suited for small sand and gravel pockets, and its cost is attractive to the operator's money pocket. This dredge will accommodate a 6-in. dredging pump with driver and all accessories. It is readily transported overland and may be used at a number of successive locations. Operators of small sand and gravel deposits will find this Morris bantam dredge well worth inquiring about. Complete information on request.



Three "highs" that may trouble producers . . .

Have you *highly* abrasive materials that you want to pump against *high* heads with *high* efficiencies? If so, the Morris Type F Heavy-duty Dredging Pump is the unit for you. Its large diameter impeller runs at slow speed, thus reducing wear. The design of its waterways minimizes hydraulic losses without requiring mechanical or external water seals, thus maintaining high efficiency independent of wear. The casing, impeller, stuffing box and bearings all have special features that make this pump ideally suited for severe duties. Complete information in bulletin which will be sent on request.

For authoritative recommendations on any pumping or dredging problem, write to Morris Machine Works, Baldwinsville, N. Y. Representatives in principal cities

G-E CABLE OPERATES AT 4 TIMES RATED VOLTAGE

ORDINARILY, you wouldn't think of asking a 600-volt cable to operate on a 2300-volt circuit. And we're not suggesting that you do.

But the following letter tells an interesting story of such a substitution, and it does indicate that this G-E tellurium-rubber cable is a high-grade product.

A letter received by a G-E District Cable Specialist

You will be interested in a recent emergency case in which we had a 2300-volt cable failure on two 125-horsepower fire-pump motors. It is very important to keep these fire-pump motors running seven or eight hours each day, and we suddenly found ourselves without any suitable size of 2300-volt parkway cable or rubber-covered wire.

It so happened, however, that we had on hand 300 feet of Type W, 600-volt, No. 6 stranded, tellurium-compounded all-rubber-covered cable. We immediately connected this as our emergency circuit, and it served the pumps for twenty-four hours while we were searching for something with which to replace it. Since the cable stood it in satisfactory manner, we continued to operate this way for a little over two weeks while new 2300-volt cable was purchased and shipped to us.

This is quite a satisfactory performance, inasmuch as the circuit operated at four times its normal operating voltage over a period of two weeks. I find this cable quite indispensable as an extra supply item for miscellaneous purposes where a flexible cable is wanted, especially for temporary uses. Hence, I thought you would be interested in this case.

Yours very truly,

(*Name on request*)

IT'S TELLURIUM

Three-conductor, Type W, Portable Cable

For Many Uses—For electric shovels and dredges, for mining machinery, for arc welders, for all sorts of portable equipment, there is a type and size of G-E tellurium-rubber cable that is just suited. For prices and detailed information, see Bulletins GEA-1728 and GEA-1918, which we shall be glad to send you on request to the nearest G-E sales office or General Electric, Dept. 6G-201, Schenectady, N. Y.

GENERAL ELECTRIC

BLAST THAT BARRIER

between you and the men who can help you boost sales!

Every busy executive is forced to erect somewhat of a defensive barrier between himself and the salesmen who call on him. Though his latchstring is out to all of them, his own sales problems are hidden from the majority. Yet there is one group of men who, once allowed to penetrate that barrier, can render real sales-upping aid. They are the representatives of the strong business papers possessing a thorough, intimate knowledge of the markets they serve. Given the chance, they can help you lick your sales problems.

And they are responsible men, representing responsible publications such as those which banded together twenty years ago to form The Associated Business Papers, Inc. Ethically administered, vigorously edited, these industrial, trade and professional papers have become the pace-setters of business paper publishing. They devote themselves so diligently to the subscribers' interests that they actually deliver "packaged influence" to a "conditioned" audience of proved buying capacity. There's bound to be a real money's-worth of advertising value in business papers that employ highly-trained editors whose sole obligation is to glean and interpret important events, to advance practical ideas, and to render a tangible service to readers who want it enough to pay for it!

ROCK PRODUCTS is a member of the A. B. P. Its representatives are sincerely anxious to give you the benefit of their specialized experience. So next time a ROCK PRODUCTS man calls, invite him behind that barrier . . . avail yourself of the many ways in which he is ready, willing and able to work for you.

TWELVE WAYS THE ROCK PRODUCTS REPRESENTATIVE CAN HELP YOU:

1. To sense and evaluate significant trends.
2. To determine market potentials.
3. To suggest product or package changes.
4. To help you select and reach your prime prospects.
5. To help plan sales and advertising strategy.
6. To aid in improving sales and distributive setup.
7. To translate all available market and sales statistics into terms of your particular problem.
8. To scan copy for trade jargon.
9. To suggest new products, or new markets for old products.
10. To suggest ways to make sales promotion more effective.
11. To help devise practical merchandising material.
12. To point out specific sales opportunities.

MEMBER AUDIT BUREAU OF CIRCULATIONS

Impartial measurement of reader interest in terms of paid circulation

ROCK PRODUCTS BEARS THE TWIN HALL-MARKS OF KNOWN VALUE

ABP

Authentic facts relating to editorial scope and readership analysis

ROCK PRODUCTS

205 W. Wacker Drive
Chicago, Illinois

Manufacturers' Division Exposition

IN CONJUNCTION WITH THE

Twenty-First Annual Convention

OF THE

National Crushed Stone Association

Netherland Plaza Hotel **Cincinnati, Ohio**

January 24, 25 and 26, 1938

• •

• • **AN EXCELLENT** opportunity for manufacturers of machinery, equipment and supplies used in the production of crushed stone to bring their products to the intimate attention of the foremost producers of the United States and Canada and under particularly favorable circumstances.

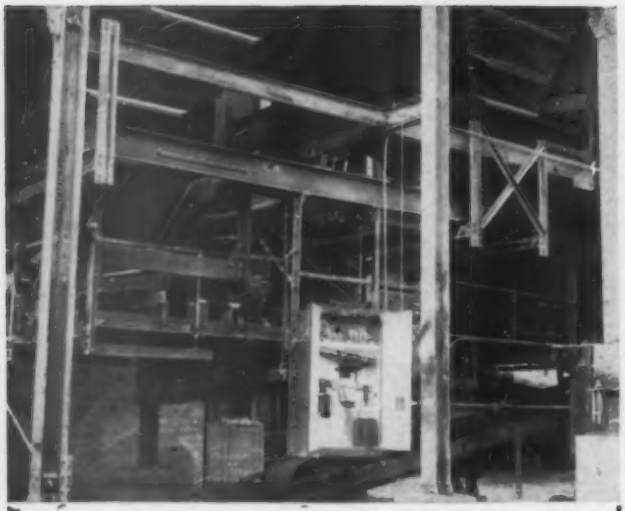
• •

FOR FULL INFORMATION, WRITE TO

National Crushed Stone Association

1735 Fourteenth Street, Northwest

Washington, D. C.



RICHARDSON
CONVEY-O-WEIGHS
Protect Profits

Above illustration shows interior of cement plant where four Richardson Convey-o-weighs were installed to accurately proportion shale and limestone, clinker and gypsum, thus assuring a uniform product and no spoiled mixes. The machines weigh and record and deliver materials without interruption. Sturdy construction plus simplicity of design reduces maintenance to the minimum.

Richardson Convey-o-weighs will proportion any two or more ingredients—they may also be used for weighing any single material as received, as processed, as fired to or discharged from kilns, to storage or in shipment.

Let our engineers assist you in planning an installation of CONVEY-O-WEIGHS that will positively and accurately control your operations, reduce costs and send your profits upward.

Richardson Scale Company

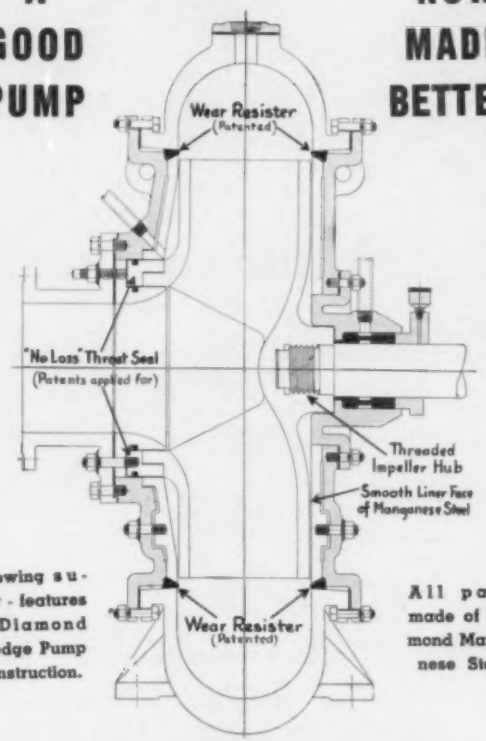
CLIFTON, NEW JERSEY

NEW YORK MINNEAPOLIS CHICAGO OMAHA BOSTON SAN FRANCISCO BUFFALO ATLANTA PHILADELPHIA WICHITA COLUMBUS

Agents for Eastern Canada: Messrs. Peacock Brothers, Ltd., Montreal & Toronto

DIAMOND

A GOOD PUMP NOW MADE BETTER



Showing super-features of Diamond Dredge Pump construction.

All parts made of Diamond Manganese Steel.

DIAMOND DREDGE PUMPS

now give their users even better performance because of newly developed features. Operators can now produce material at a still lower cost.

The patented "Wear Resister" protects pump shell, side plates and liners from wear at vital points. Threaded Impeller Hub or Bore gives greater impeller throat clearance and insures a true running impeller at all times. "No Loss" Throat Seal prevents internal leakage. P. M. Co. Products include Traveling Chain Cutter, Rotary Cutters, Elbows, Flap Valves, Nipples, Jaw Plates, Crusher Parts, Dippers, Dipper Teeth, Sheaves, and other Manganese Steel Products.

PETTIBONE MULLIKEN CORP.

4710 W. DIVISION ST. • CHICAGO, ILL.

Classified Directory of Advertisers in this Issue of ROCK PRODUCTS

For alphabetical index, see page 126

Acetylene Welding Rod
American Steel & Wire Co. (United States Steel Corp. Subsidiary)

Agitators, Thickeners and Slurry Mixers
The Dorr Co.
Hardinge Co., Inc.
F. L. Smidth & Co.

Air Compressors
Fuller Co.
Ingersoll-Rand Co.
Nordberg Mfg. Co.
F. L. Smidth & Co.

Air Filters
Fuller Co.

Air Filter Frames
Fuller Co.

Air Separators
Hardinge Co., Inc.
Raymond Pulverizer Division
Sturtevant Mill Co.
Universal Road Machy. Co.
Williams Patent Crusher & Pulv. Co.

Airveyor
Fuller Co.

Alloys (Metal)
Chicago Steel Foundry Co.

Ash & Refuse Handling Equipt.
Allen-Sherman Hoff Co.

Automatic Weighers
Richardson Scale Co.

Backfillers
Bucyrus-Erie Co.
Lima Locomotive Works, Inc.

Bag Filling and Weighing Equipt.
Syntron Co.

Balls, Grinding, (See Grinding Balls)

Balls (Tube Mill, etc.)
Allis-Chalmers Mfg. Co.
Carnegie-Illinois Steel Corp. (United States Steel Corp. Subsidiary)
Hardinge Co., Inc.
F. L. Smidth & Co.
Traylor Engineering & Mfg. Co.

Bar Benders and Cutters
Koehring Co.

Batchers, Measuring Volume
Besser Mfg. Co.
Fuller Company
Jaeger Machine Co.

Bearings
Link-Belt Co.
Standard Pressed Steel Co.
Timken Roller Bearing Co.

Bearings (Anti-Friction)
Standard Pressed Steel Co.
Timken Roller Bearing Co.

Bearings (Roller)
Timken Roller Bearing Co.

Bearings (Tapered Roller)
Timken Roller Bearing Co.

Bearings (Thrust)
Timken Roller Bearing Co.

Belt Fasteners
Flexible Steel Lacing Co.

Belting
Hewitt Rubber Co.
Robins Conveying Belt Co.

Belting (Metal Conveyor, High & Low Temperature)
Wickwire-Spencer Steel Co.

Belt Lacing (Steel)
Flexible Steel Lacing Co.

Belting (Elevator and Conveyor)
B. F. Goodrich Co.

Belting (Transmission)
B. F. Goodrich Co.
Hewitt Rubber Co.

Belting (V Type)
B. F. Goodrich Co.
Manhattan Rubber Mfg. Co.

Bin Gates
Allen-Sherman-Hoff Co.
Fuller Co.
Geo. Haiss Mfg. Co., Inc.
Industrial Brownhoist Corp.
Link-Belt Co.
Universal Road Machy. Co.

Bins, Hoppers
Besser Mfg. Co.
Blaw-Knox Co.
Chicago Bridge & Iron Works
Universal Road Machy. Co.
Webster Mfg. Co.

Bins, Storage (Steel)
Besser Mfg. Co.
Pioneer Gravel Equipt. Mfg. Co.

Blasting Cap Protectors
B. F. Goodrich Co.

Blasting Machines
Atlas Powder Co.

Blasting Supplies
Atlas Powder Co.

Blasting Powder (See Powder, Blasting)

Block Machines, Building
Anchor Concrete Machinery Co.
Besser Mfg. Co.
Multiplex Concrete Machy Co.
R & L Concrete Machy. Co.
Stearns Mfg. Co.

Block Machines, Silo
Besser Mfg. Co.

Blocks (Pillow, Roller Bearing)
Link-Belt Co.
Standard Pressed Steel Co.
Timken Roller Bearing Co.

Bodies (Car and Motor Truck)
Easton Car & Constr. Co.

Boilers
Babcock & Wilcox Co.
Combustion Engineering Corp.
Jackson & Church Iron Wks.

Belts
Standard Pressed Steel Co.

Boots and Shoes
B. F. Goodrich Co.

Breakers (Primary)
Smith Engineering Works
Traylor Engineering & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Brick Machines
Besser Mfg. Co.

Buckets (Clamshell, Grab, Orange Peel, etc.)
Blaw-Knox Co.
Geo. Haiss Mfg. Co., Inc.
Hayward Company
Industrial Brownhoist Corp.
Link-Belt Co.
Owen Bucket Co.
Wellman Engineering Co.

Buckets (Dragline and Slackline)
Blaw-Knox Co.
Bucyrus-Erie Co.
Owen Bucket Co.
Wellman Engineering Co. (G. H. Williams)

Buckets (Dredging and Excavating)
Geo. Haiss Mfg. Co., Inc.
Owen Bucket Co.

Buckets (Dump)
Dempster Bros., Inc.

Buckets (Elevator and Conveyor)
Fielder, C. L., Co.
Hendrick Mfg. Co.
Industrial Brownhoist Corp.
Jeffrey Mfg. Co.
Link-Belt Co.
Pettibone Mulliken Corp.
Robins Conveying Belt Co.
Taylor-Wharton Iron & Steel Co.

Bulldozers
Blaw-Knox Co.
Bucyrus-Erie Co.
Koehring Co.

Bullscrapers
Bucyrus-Erie Co.

Cableways
American Steel & Wire Co. (United States Steel Corp. Subsidiary)
Bethlehem Steel Co.
Broderick & Bascom Rope Co. (Yellow Strand)
General Electric Co.
Link-Belt Co.
Macwhyte Co.
Roebling's, John A., Sons Co.
Sauerman Bros.
Wellman Engineering Co. (G. H. Williams)

Calcinators
Traylor Engineering & Mfg. Co.

Cap Crimpers and Fuse Cutters
Ensign-Bickford Co.

Caps (Blasting)
Atlas Powder Co.

Car Pullers
Link-Belt Co.

Cars (Dump)
Carnegie-Illinois Steel Corp. (United States Steel Corp. Subsidiary)

Cars (Quarry & Gravel Pit)
Austin-Western Road Machinery Co.
Carnegie-Illinois Steel Corp. (United States Steel Corp. Subsidiary)
Easton Car & Constr. Co.

Cars and Track, Industrial
Besser Mfg. Co.
Chase Foundry & Mfg. Co.

Castings
Babcock & Wilcox Co.
Birdsboro Steel Fdry. & Mach. Co.
C. G. Buchanan Co., Inc.
Chicago Steel Foundry Co.
Eagle Iron Works (Grey Iron)
Link-Belt Co.
Timken Roller Bearing Co.

Cement Making Machinery
F. L. Smidth & Co.
Traylor Engineering & Mfg. Co.

Cement Paints
Tamms Silica Co.

Cement Process
Cement Process Corp.

Cement Pumps
Fuller Co.
F. L. Smidth & Co.

Central Mixing Plants (Concrete)
Blaw Knox Co.
Jaeger Machine Co.

Chain (Dredge and Steam Shovel)
Bucyrus-Erie Co.
Jeffrey Mfg. Co.

Chain (Elevating and Conveying)
Jeffery Mfg. Co.
Link-Belt Co.
Pettibone Mulliken Corp.

Chain Systems (Kilns)
F. L. Smidth & Co.

Chimney Block Machines and Molds
Besser Mfg. Co.

Chutes and Chute Liners
Earl C. Bacon, Inc.

Clarifiers
The Dorr Co.
Hardinge Co., Inc.

Classifiers
Allen Cone & Machy. Corp.
The Dorr Co.
Hardinge Co., Inc.
Link-Belt Co.
Nordberg Manufacturing Co.

Clips (Wire Rope)
Allen Cone & Machy. Corp.
Bethlehem Steel Co.
Broderick & Bascom Rope Co. (Yellow Strand)
Macwhyte Co.

Coal Crushers and Rolls
Williams Patent Crusher & Pulv. Co.

Coal Pulverizing Equipment
Babcock & Wilcox Co.
Gruendler Crusher & Pulv. Co
Hardinge Company, Inc.
Pennsylvania Crusher Co.
Raymond Pulverizer Division
F. L. Smidth & Co.
Williams Patent Crusher & Pulv. Co.

Collars (Shafting)
Standard Pressed Steel Co.

Colors, Cement
Geo. S. Mepham Corp.
Tamms Silica Co.

Compressors (See Air Compressors)

Concentrators (Slurry, etc.)
The Dorr Co.

Concrete Breakers
Ingersoll-Rand Co.

Concrete Slab Raising Equipment (Mud-Jack)
Koehring Co.

Conveyor Belting (See Belting)

Conveyor Idlers and Rolls
C. O. Bartlett & Snow Co.
Jeffrey Mfg. Co.
Link-Belt Co.

Conveyors and Elevators
Earle C. Bacon
Besser Mfg. Co.
Fuller Company
Geo. Haiss Mfg. Co., Inc.
Huron Industries Co.
Industrial Brownhoist Corp.
Jeffrey Mfg. Co. (Vibrating)
Lewistown Fdy. & Mach. Co.
Link-Belt Co.
Robins Conveying Belt Co
F. L. Smidth & Co.
Smith Engineering Works
Sturtevant Mill Co.
Universal Road Machy. Co.
Webster Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Conveyors (Hydro Vacuum)
Allen-Sherman Hoff Co.

Conveyors (Pneumatic)
Fuller Company

Conveyors (Screw)
Link-Belt Co.

Conveyors (Spiral)
Jeffrey Mfg. Co.

Conveyors (Vibratory)
Syntron Co.

Conveyoweighs
Richardson Scale Co.

Correcting Basins
F. L. Smidth & Co.

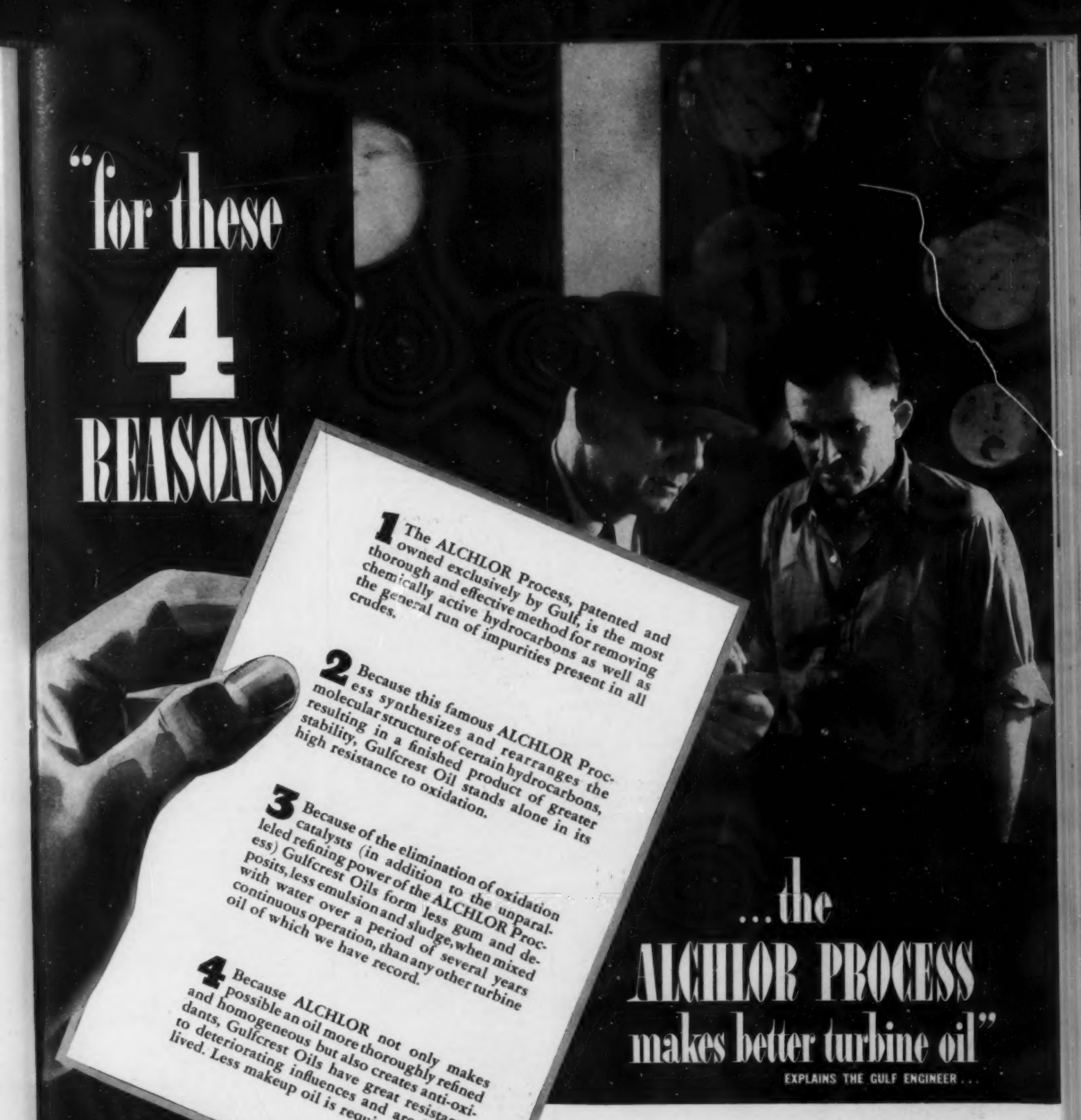
Couplings (Air Hose)
Ingersoll-Rand Co.

Couplings (Flexible and Shaft)
Huron Industries Co.
Link-Belt Co.
Standard Pressed Steel Co.

Couplings (Hose, Pipe, etc.)
B. F. Goodrich Co.
Hewitt Rubber Co.

Cranes (Clamshell)
Bucyrus-Erie Co.
Koehring Co.

Cranes (Crawler and Locomotive)
Bucyrus-Erie Co.
Harnischfeger Corp.
Industrial Brownhoist Corp.
Koehring Co.
Lima Locomotive Works, Inc.
Link-Belt Co.
Northwest Engineering Co.



"for these 4 REASONS ...the ALCHLOR PROCESS makes better turbine oil"

EXPLAINS THE GULF ENGINEER . . .

1 The ALCHLOR Process, patented and owned exclusively by Gulf, is the most thorough and effective method for removing chemically active hydrocarbons as well as the general run of impurities present in all crudes.

2 Because this famous ALCHLOR Process synthesizes and rearranges the molecular structure of certain hydrocarbons, resulting in a finished product of greater stability, Gulfcrest Oil stands alone in its high resistance to oxidation.

3 Because of the elimination of oxidation catalysts (in addition to the unparalleled refining power of the ALCHLOR Process) Gulfcrest Oils form less gum and deposits, less emulsion and sludge, when mixed with water over a period of several years continuous operation, than any other turbine oil of which we have record.

4 Because ALCHLOR not only makes possible an oil more thoroughly refined and homogeneous but also creates anti-oxidants, Gulfcrest Oils have great resistance to deteriorating influences and are longer lived. Less makeup oil is required.

Gulfcrest is the only ALCHLOR Processed turbine oil. Treatment by the ALCHLOR Process gives Gulfcrest Oil certain important characteristics which can not be developed by any other refining method in use today. Under the most gruelling tests, it has shown the greatest stability ever attained in a turbine oil.

GULFPRIDE . . . THE WORLD'S FINEST MOTOR OIL . . . IS REFINED BY THE SAME PROCESS (GULF'S EXCLUSIVE ALCHLOR PROCESS) AS GULFCREST OIL

GULF INDUSTRIAL LUBRICATION

GULF OIL CORPORATION • GULF REFINING COMPANY

GENERAL OFFICES: GULF BUILDING, PITTSBURGH, PA

Classified Directory—*Continued*

Cranes (Excavator)
Koehring Co.

Cranes (Overhead Traveling Electric)
Industrial Brownhoist Corp.

Crusher Parts
American Pulverizer Co.
Birdsboro Steel Fdry. & Mach. Co.
C. G. Buchanan Co., Inc.
Pennsylvania Crusher Co.
Taylor-Wharton Iron & Steel Co.
Traylor Engineering & Mfg. Co.

Crushers (Hammer)
American Pulverizer Co.
Carnegie-Illinois Steel Corp. (United States Steel Corp. Subsidiary)
The C. O. Bartlett & Snow Co.
Dixie Machy. Mfg. Co
Gruendler Crusher & Pulv. Co
Jeffrey Mfg. Co.
Pennsylvania Crusher Co.
Sturtevant Mill Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Jaw and Gyratory)
Allis-Chalmers Mfg. Co
Austin-Western Road Machinery Co.
Earle C. Bacon, Inc.
Birdsboro Steel Foundry & Mach. Co.
C. G. Buchanan Co., Inc.
Gruendler Crusher & Pulv. Co.
Jeffrey Mfg. Co.
Lewistown Fdy. & Mach. Co (Jaw)
New Holland Machine Co.
Nordberg Mfg. Co.
Pennsylvania Crusher Co.
Smith Engineering Works
Universal Road Machy. Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Reduction)
Austin-Western Road Machinery Co.
Earle C. Bacon, Inc.
Birdsboro Steel Fdry. & Mach. Co.
C. G. Buchanan Co., Inc.
Jeffrey Mfg. Co
Traylor Engineering & Mfg. Co.

Crushers (Ring)
American Pulverizer Co.

Crushers (Roll)
American Pulverizer Co.
Austin-Western Road Machinery Co.
Gruendler Crusher & Pulv. Co.
New Holland Machine Co.
Pioneer Gravel Equipt. Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Rotary)
American Pulverizer Co.

Crushers (Single Roll)
American Pulverizer Co.
Gruendler Crusher & Pulv. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
New Holland Machine Co.
Pennsylvania Crusher Co.

Crushing Rolls
Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
Birdsboro Steel Foundry & Mach. Co.
C. G. Buchanan Co., Inc.
Jeffrey Mfg. Co.
New Holland Machine Co.
Pettibone Mulliken Corp.
Sturtevant Mill Co.

Curing Racks
Multiplex Concrete Machy Co.

Dedusters
Blaw-Knox Co.

Detonators
Atlas Powder Co.

Dewatering Machines
The Dorr Co.

Diaphragms (Pump)
B. F. Goodrich Co.

Dippers & Teeth
Pettibone Mulliken Corp.

Dippers and Teeth (Steam Shovel)
Bucyrus-Erie Co.

Dipper Teeth (Manganese)
Taylor-Wharton Iron & Steel Co.

Dirt Moving Equipt.
Austin-Western Road Machinery Co.

Dirt Moving Equipt. (Dumptor)
Koehring Co.

Ditchers
Bucyrus-Erie Co.

Draglines
Austin-Western Road Machinery Co.
Bucyrus-Erie Co.
Link-Belt Co.
Northwest Engineering Co.

Draglines (Gasoline or Electric)
Koehring Co.

Dragline Cableway Excavators
Bucyrus-Erie Co.
Link-Belt Co.
Sauerman Bros., Inc.

Dragline Excavators
Bucyrus-Erie Co.
Lima Locomotive Works, Inc.
Northwest Engineering Co.

Dredge Pumps (See Pumps, Dredging)

Dredges
Bucyrus-Erie Co.
Hayward Co.
Hetherington & Berner, Inc. (Complete Steel)
Morris Machine Works

Dredging Sleeves
B. F. Goodrich Co.

Drill Bits
Ingersoll-Rand Co.
Timken Roller Bearing Co

Drill Sharpening Machines
Ingersoll-Rand Co.

Drill Steel
Ingersoll-Rand Co.

Drills
Bucyrus-Erie Co.
Timken Roller Bearing Co

Drills (Diamond Core)
Ingersoll-Rand Co.

Drills, Hammer (See Hammer Drills)

Drills (Rock)
Ingersoll-Rand Co.

Drills (Wagon)
Ingersoll-Rand Co.

Drives (Short Center) See also Belting, etc.
Allis-Chalmers Mfg. Co.
Earle C. Bacon, Inc.

Dryers
Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
Combustion Engineering Corp.
Hardinge Company, Inc.
W. S. Tyler Co.

Dumptors
Koehring Co.

Dust Collecting Systems
Allen Sherman Hoff Co.
Allis-Chalmers Mfg. Co.
The C. O. Bartlett & Snow Co.
Blaw Knox Co.
Pettibone Mulliken Corp.

Dust Conveying Systems
Fuller Company

Dust Handling Systems (Hydro Vacuum)
Allen-Sherman Hoff Co.

Dynamite
Atlas Powder Co.

Electric Cables and Wires
American Steel & Wire Co. (United States Steel Corp. Subsidiary)
Roebling's, John A., Sons Co.

Electric Mine Hoists
Allis-Chalmers Mfg. Co.
Nordberg Mfg. Co.

Electric Power Equipment
Allis-Chalmers Mfg. Co.
General Electric Co.

Elevator Belting (See Belting)

Emery Mills
Sturtevant Mill Co.

Classified Directory—*Continued*

Engineers
The Dorr Co.
Fuller Co.
Hetherington & Berner, Inc.
Productive Equipment Corp.
Robins Conveying Belt Co.
F. L. Smidth & Co.
Sturtevant Mill Co.
Traylor Engineering & Mfg. Co.
Webster Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Engines (Diesel)
Ingersoll-Rand Co.
Nordberg Mfg. Co.

Excavating Machinery (See Shovels, Cranes, Buckets, etc.)

Excavators (Crawling Tractor)
Austin-Western Road Machinery Co.
Koehring Co.

Excavators (Dragline)
Koehring Co.

Explosives
Atlas Powder Co.

Fans
General Electric Co.

Feeders
Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co. (Pulverized Coal)
Earle C Bacon, Inc.
Besser Mfg. Co.
Fuller Co. (Cement and Pulverized Material)
Hardinge Company, Inc. (Weighing)
Jeffrey Mfg. Co. (Pan & Tube)
Robins Conveying Belt Co.
Ross Screen & Feeder Co.
Smith Engineering Works (Plate)
Stearns Mfg. Co.
Traylor Engineering & Mfg. Co.
Webster Mfg. Co.

Feeders (Weighing)
Syntron Co.

Floor Sweeping Systems (Hydro Vacuum)
Allen-Sherman Hoff Co.

Forgings
Taylor-Wharton Iron & Steel Co.

Furnaces
Combustion Engineering Corp.

Fuses
General Electric Co.

Fuses (Detonating and Safety)
Ensign-Bickford Co.

Galvanized Wire Strand
Macwhyte Co.

Gaskets
B. F. Goodrich Co.
Hewitt Rubber Co.

Gasoline
Texas Company

Gears (Spur, Helical and Worm)
Jeffrey Mfg. Co.
Taylor-Wharton Iron & Steel Co.

Gears and Pinions
General Electric Co.
Link-Belt Co.
Pettibone Mulliken Corp.
Taylor-Wharton Iron & Steel Co.

Gelatin and Semi-Gelatin (See Explosives)

Grapples
Blaw Knox Co.
Hayward Co.
Owen Bucket Co.

Grease
Gulf Refining Co.
Texas Company

Grinding Balls
Carnegie-Illinois Steel Corp. (United States Steel Corp. Subsidiary)
Babcock & Wilcox Co.
Jeffrey Mfg. Co.

Grizzlies
Jeffrey Mfg. Co. (Vibrating)
Pettibone Mulliken Corp.
Robins Conveying Belt Co.
Smith Engineering Works

Grizzly Feeders
Jeffrey Mfg. Co.
Traylor Engr. & Mfg. Co.

Hammer Drills
Ingersoll-Rand Co.

Hammer Mills (See Crushers)

Heaters (Bitumen)
Easton Car & Constr. Co.

Hoists
Ingersoll-Rand Co.
Jackson & Church Iron Wks.
Jaeger Machine Co.
Link-Belt Co.
Northwest Engineering Co.
Webster Mfg. Co.

Hooks (Wire Rope)
Macwhyte Co.

Hoppers
Webster Mfg. Co.

Hose (Water, Steam, Air Drill, Pneumatic, Sand Suction and Discharge)
B. F. Goodrich Co.
Hewitt Rubber Co.
Ingersoll-Rand Co.
Manhattan Rubber Mfg. Co.

Hose Couplings (See Couplings—Hose, Pipe, etc.)

Hydrators
Blaw-Knox Co.
Jackson & Church Iron Wks.

Insulation (Electric)
General Electric Co.

Kilns (Shaft)
Hardinge Company, Inc

Kilns and Coolers (Rotary
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Hardinge Co., Inc.
F. L. Smidth & Co.

Kominuters (See Mills)

Laboratory Crushers
Birdsboro Steel Foundry & Machine Co.
C. G. Buchanan Co., Inc.
Sturtevant Mill Co.
Williams Patent Crusher Pulv. Co.

Lamp Guards
Flexible Steel Lacing Co.

Lighters, Hot Wire (For Safety Fuse)
Ensign-Bickford Co.

Lime Handling Equipment
Fuller Company
Hardinge Co., Inc.
Link-Belt Co.
Raymond Pulverizer Division

Lime Kilns (See Kilns and Coolers, Rotary)

Lime Putty Plants
Chicago Bridge & Iron Works

Linings (Iron for Ball and Tube Mills) (See Mill Liners)

Linings (Rubber for Chutes, Ball and Tube Mills, Tank and Pipe)
B. F. Goodrich Co.

Loaders and Unloaders
Bucyrus-Erie Co.
Fuller Company
Geo. Haiss Mfg. Co., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
Northwest Engineering Co.
Robins Conveying Belt
Universal Road Machy. Co.

Locomotive Cranes (See Cranes, Crawler and Locomotive)

Locomotives (Diesel Electric)
Davenport-Besler Corp.

Locomotives (Diesel Mechanical)
Davenport-Besler Corp.

Locomotives (Gas-Electric)
Davenport-Besler Corp.
Jeffrey Mfg. Co.

Locomotives (Storage Battery)
General Electric Co.
Jeffrey Mfg. Co.

Locomotives (Steam, Gas and Electric
Davenport-Besler Corp.
General Electric Co.

Log Washer
McLanahan & Stone Corp.
Smith Engineering Works

Lubricants
Gulf Refining
Texas Company

Lubricants (Wire Rope)
American Steel & Wire Co. (United States Steel Corp. Subsidiary)
Broderick & Bascom Rope Co. (Yellow Strand)
Macwhyte Co.

Classified Directory—*Continued*

Machinery Guards
Harrington & King Perf. Co.
W. S. Tyler Co.

Magnets
General Electric Co.

Magnetic Pulleys
Birdsboro Steel Foundry & Mach. Co.
C. G. Buchanan Co., Inc.

Manganese Steel Castings
Pettibone Mulliken Corp.
Taylor-Wharton Iron & Steel Co.

Manganese Welding Rod
Taylor-Wharton Iron & Steel Co.

Material Handling Equipment
Austin-Western Road Machinery Co.
Jeffrey Mfg. Co.
Syntron Co.

Mechanical Rubber Goods
B. F. Goodrich

Mill Liners and Linings (Iron for Ball and Tube Mills)
Babcock & Wilcox Co.
Carnegie-Illinois Steel Corp. (United States Steel Corp. Subsidiary)
Hardinge Company, Inc.
Jeffrey Mfg. Co.
F. L. Smidth & Co.
Traylor Engineering & Mfg. Co.

Mills, Grinding (Ball, Tube, etc.) (See also Crushers, Hammer)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Gruendler Crusher & Pulv. Co.
Hardinge Co., Inc.
Raymond Pulverizer Division
F. L. Smidth & Co.
Williams Patent Crusher & Pulv. Co.

Mine Car Hitchings
Macwhyte Co.

Mixers (Commercial Concrete)
Jaeger Machine Co.

Mixers (Concrete)
Anchor Concrete Machy. Co.
Besser Mfg. Co.
Gruendler Crusher & Pulv. Co.
Jaeger Machine Co.
Koehring Co.

Mortar Colors
Geo. S. Mepham Corp.
Tamms Silica Co.

Motors and Generators (Electric Units)
Allis-Chalmers Mfg. Co.
General Electric Co.

Multiple V-Belts (See Belting, V Type)

Nuts (Lock)
Standard Pressed Steel Co.

Oil Burners
Babcock & Wilcox Co.
F. L. Smidth & Co.

Oils (Lubricating)
Gulf Refining Co.
Texas Company

Packings (Pump, Valve, etc.)
B. F. Goodrich
Hewitt Rubber Co.

Paint (Asphalt)
Texas Company

Pallets
Anchor Concrete Machinery Co.
Besser Mfg. Co.
Commercial Shearing and Stamping Co.
Multiplex Concrete Machy Co.
Stearns Mfg. Co.

Pavers (Concrete)
Koehring Co.

Perforated Metal
Chicago Perforating Co.
Harrington & King Perf. Co.
Hendrick Mfg. Co.
Joseph T. Ryerson & Son, Inc.
Wickwire-Spencer Steel Co.

Perforated Metal (Manganese)
Taylor-Wharton Iron & Steel Co.

Pipe Machines
Besser Mfg. Co.

Pipe Molds (Concrete)
Besser Mfg. Co.
Stearns Mfg. Co.

Plants (Crushing)
Austin-Western Road Machinery Co.
Traylor Engineering & Mfg. Co.

Plants (Sand and Gravel)
Austin-Western Road Machinery Co.
Traylor Engineering & Mfg. Co.

Plants (Stone Crushing)
Austin-Western Road Machinery Co.
Traylor Engineering & Mfg. Co.

Plates (Double Corrugated)
Hendrick Mfg. Co.

Pneumatic Drills (See Drills)

Portable Conveyors
Fuller Company
Geo. Haiss Mfg. Co., Inc.
Link-Belt Co.

Portable Crushing and Screening Unit
Austin-Western Road Machinery Co.
Pioneer Gravel Equipt. Mfg. Co.
Smith Engineering Works
Williams Patent Crusher & Pulv. Co.

Portable Loaders
Geo. Haiss Mfg. Co., Inc.
Jeffrey Mfg. Co.

Powder (Blasting)
Atlas Powder Co.

Power Tampers
Besser Mfg. Co.

Power Transmission Equipment
Standard Pressed Steel Co.

Pulleys, Magnetic (See Magnetic Pulleys)

Pulverators
Allis-Chalmers Mfg. Co.

Pulverizers (See also Crushers, Mills, etc.)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Babcock & Wilcox Co.
Dixie Machy. Mfg. Co.
Gruendler Crusher & Pulv. Co.
Hardinge Co., Inc.
Jeffrey Mfg. Co.
New Holland Machine Co.
Pennsylvania Crusher Co.
Raymond Pulverizer Division
F. L. Smidth & Co.
Sturtevant Mill Co.
Traylor Engineering & Mfg. Co.
Universal Road Machy. Co.
Williams Patent Crusher & Pulv. Co.

Pumps (Air Lift)
Fuller Company

Pumps (Cement)
Fuller Company

Pumps (Cement Slurry)
Allen-Sherman Hoff Co.
The Dorr Co.
Morris Machine Works
F. L. Smidth & Co.
A. R. Wilfley & Sons

Pumps (Centrifugal)
Allen Cone & Machy. Corp.
Allen-Sherman Hoff Co.
Allis-Chalmers Mfg. Co.
Hetherington & Berner, Inc.
Ingersoll-Rand Co.
Jaeger Machine Co.
Morris Machine Works
A. R. Wilfley & Sons

Pumps (Dredging)
Allen-Sherman Hoff Co.
Bucyrus-Erie Co.
Morris Machine Works

Pumps (Pulverized Coal)
Babcock & Wilcox Co.

Pumps (Sand and Gravel)
Allen-Sherman Hoff Co.
Allis-Chalmers Mfg. Co.
Hetherington & Berner, Inc.
Morris Machine Works
Pettibone Mulliken Corp.
A. R. Wilfley & Sons

Racks or Decks for Lift Trucks
Besser Mfg. Co.
Chase Foundry & Mfg. Co.

Railways (Electric)
General Electric Co.

Railway Equipment
General Electric Co.

Ready Mixed Concrete Plants
Blaw-Knox Co.
Jaeger Machine Co.

Classified Directory—*Continued*

Ready Mixed Concrete (Truck Mixer Bodies)
Blaw-Knox Co.
Jaeger Machine Co.

Reciprocator Feeder for Unloading Hopper Bottom Cars
Besser Mfg. Co.

Road Machinery
Austin-Western Road Machinery Co.
Blaw-Knox Co.
Harnischfeger Co.
Koehring Co.
Northwest Engineering Co.

Rock Bits (See Drill Bits)

Rod Mills
Hardinge Co., Inc.
Jackson & Church Iron Wks.

Rods (Wire)
Wickwire-Spencer Steel Co.

Roller Bearings
Timken Roller Bearing Co.

Roofing (Ready to Lay)
Texas Company

Rope, Wire (See Wire Rope)

Rotary Screens (Sections and Segments)
Hendrick Mfg. Co.

Sack Baiers
Besser Mfg. Co.

Sand and Gravel Screening and Washing Equipt.
Universal Road Machy. Co.

Sand Drag
Smith Engineering Works

Sand Settling Tanks
Allen Cone & Machy. Corp.
Jeffrey Mfg. Co.
Link-Belt Co.
Nordberg Manufacturing Co.
Smith Engineering Works

Scales (Automatic Proportioning)
Richardson Scale Co.

Scales (Cement)
Richardson Scale Co.

Scrapers (Power Drag)
Blaw-Knox Co.
Bucyrus-Erie Co.
Link-Belt Co.
Northwest Engineering Co.
Sauerman Bros., Inc.

Screens
Allis-Chalmers Mfg. Co.
Earle C. Bacon, Inc.
Bartlett & Snow Co.
Besser Mfg. Co.
Carnegie-Illinois Steel Corp. (United States Steel Corp. Subsidiary)
Chicago Perforating Co.
Cleveland Wire Cloth & Mfg. Co.
Hardinge Co., Inc.
Harrington & King Perf. Co.
Hendrick Mfg. Co.
Industrial Brownhoist Corp.
Jeffrey Mfg. Co.
Link-Belt Co.
Ludlow-Saylor Wire Co.
New Holland Machine Co.
Nordberg Mfg. Co.
Pioneer Gravel Equipt. Mfg. Co.
Productive Equipment Corp.
Robins Conveying Belt Co.
Roebling's, John A., Sons Co.
Ross Screen & Feeder Co.
Simplicity Engineering Co.
Smith Engineering Works
Sturtevant Mill Co.
Universal Road Machy. Co.
Universal Vib. Screen Co.
Webster M'g. Co.
Williams Patent Crusher & Pulv. Co.

Screens (Revolving)
Geo. Haiss Mfg. Co., Inc.

Screens, Scalping (Hercules and Standard)
Smith Engineering Works
Williams Patent Crusher & Pulv. Co.

Screens (Perforated
Hendrick Mfg. Co.

Screens (Testing)
Hendrick Mfg. Co.

Screens (Vibrating)
Allen Cone & Machy. Corp.
Allis-Chalmers Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Nordberg Mfg. Co
Robins Conveying Belt Co.
Simplicity Engineering Co.
Smith Engineering Works
Sturtevant Mill Co.
W. S. Tyler Co.
Universal Vib. Screen Co.
Williams Patent Crusher & Pulv. Co.

Screens, Washing (Hercules, Ajax and Standard)
Smith Engineering Works

Screens (Woven Wire)
Wickwire-Spencer Steel Co.

Screw Conveyors
Besser Mfg. Co.

Screw Rewasher (Single and Twin)
Smith Engineering Works

Screws (Cap, Self Locking, Set, Hollow Set)
Standard Pressed Steel Co.

Scrubbers, Washers
Allis-Chalmers Mfg. Co.
Earle C. Bacon, Inc.
Hardinge Company, Inc.
Lewistown Fdy. & Mach. Co.
Smith Engineering Works
Traylor Engineering & Mfg. Co.

Seal Rings (Kilns, Coolers and Dryers)
Huron Industries Co.

Separators (Magnetic)
Birdsboro Steel Foundry & Mach. Co.
C. G. Buchanan Co., Inc.

Separators (Slurry)
F. L. Smidth & Co.

Shovel Repair Parts (Manganese)
Taylor-Wharton Iron & Steel Co.

Seal Rings (Kilns, Coolers and Dryers)

Shovels, Power (Steam, Gas, Electric, Diesel, Oil)
Austin-Western Road Machinery Co.
Bucyrus-Erie Co.
Harnischfeger Corp.
Industrial Brownhoist Corp.
Koehring Co.
Lima Locomotive Works, Inc. (Ohio Power Shovel Co.)
Link-Belt Co.
Northwest Engineering Co. (Crawling Tractor)

Silos
Chicago Bridge & Iron Co.
F. L. Smidth & Co.

Skip Hoists and Skips
Link-Belt Co.

Slings (Wire Rope)
American Cable Co., Inc.
American Steel & Wire Co. (United States Steel Corp. Subsidiary)
Bethlehem Steel Co.
Broderick & Mascom Rope Co. (Yellow Strand)
A. Leschen & Sons Rope Co
Macwhyte Co.
Roebling's, John A., Sons Co.

Smokestacks
Chicago Bridge & Iron Works

Sockets (Wire Rope)
American Steel & Wire Co. (United States Steel Corp. Subsidiary)
Macwhyte Co.

Special Aggregates
Tamms Silica Co.

Speed Reducers
Link-Belt Co.

Sprockets and Chain
Taylor-Wharton Iron & Steel Co.

Standpipes
Chicago Bridge & Iron Works
Ross Screen & Feeder Co.

Steel, Abrasion Resisting
Joseph T. Ryerson & Son, Inc.

Steel Bars
Timken Roller Bearing Co.

Steel (Electric Furnace)
Chicago Steel Foundry Co.
Timken Roller Bearing Co.

Steel (Open Hearth)
Timken Roller Bearing Co.

Classified Directory—*Continued*

Steel (Special Alloy)
Timken Roller Bearing Co.

Steel (Special Analysis)
Timken Roller Bearing Co.

Steels, Drill (See Drill Steel)

Stokers
Babcock & Wilcox Co.
Combustion Engineering Corp.

Storage Equipt.
Kern, Fred T. Co.

Strippers
Besser Mfg. Co.

Stucco Materials
Geo. S. Mepham Corp.

Tampers (Automatic)
Multiplex Concrete Machy Co.

Tanks
Allen Cone & Machy. Corp.
Combustion Engineering Corp.
The Dorr Co.
Hendrick Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.

Thickeners
The Dorr Co.
Hardinge Co., Inc.

Thimbles
Macwhyte Co.

Tile Machines (Drain)
Besser Mfg. Co.

Tires and Tubes
B. F. Goodrich Co.

Tools (Pneumatic)
Ingersoll-Rand Co.

Track Equipment
Carnegie-Illinois Steel Corp. (United States Steel Corp. Subsidiary)
Nordberg Mfg. Co.
Taylor-Wharton Iron & Steel Co.

Track Shifters
Nordberg Mfg. Co.

Tractors
Koehring Co.

Tramways (Aerial Wire Rope)
American Steel & Wire Co. (United States Steel Corp. Subsidiary)
Bethlehem Steel Co.
Broderick & Bascom Rope Co. (Yellow Strand)
A. Leschen & Sons Rope Co.
Macwhyte Co.
Roebling's, John A., Sons Co.

Transmission Belting (See Belting)

Transmission Machinery
Allis-Chalmers Mfg. Co.
Timken Roller Bearing Co.

Truck Bodies (Dump)
Easton Car & Constr. Co.

Truck Bodies (Ready Mixed Concrete)
Blaw-Knox Co.
Jaeger Machine Co.

Trucks (Mixers)
Blaw-Knox Co.
Jaeger Machine Co.

Trucks and Trailers (See Motor Trucks)

Tube Mills (See Mills, Ball, Tube, etc.)

Tube Mill Liners (See Mill Liners)

Tubing (Blasting)
B. F. Goodrich Co.

Tubing (Seamless Steel)
Timken Roller Bearing Co.

Turnbuckles
Macwhyte Co.

Underground Shovels
Nordberg Mfg. Co.

Valves (Pump)
B. F. Goodrich Co.

Vibrating Screens (See Screens, Vibrating)

Vibrators
W. S. Tyler Co.

Wagons & Trailers (Dump)
Austin-Western Road Machinery Co.

Washers (Sand, Gravel and Stone)
Allen Cone & Machy. Co.
Allis-Chalmers Mfg. Co.
Austin-Western Road Machinery Co.
The Dorr Co.
Eagle Iron Works
Gruendler Crusher & Pulv. Co.
Hardinge Copmany, Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
Traylor Engr. & Mfg. Co.
Universal Road Machy. Co.

Waste Heat Boilers
Combustion Engineering Corp.

Waterproofing
Tamms Silica Co.

Weighing Equipment
Richardson Scale Co.

Weigh-Mix
Koehring Co.

Welding and Cutting Apparatus
General Electric Co.

Welding Rod
American Steel & Wire Co. (United States Steel Corp. Subsidiary)

Welding Rod (Manganese)
Taylor-Wharton Iron & Steel Co.

Welding Wire
American Steel & Wire Co. (United States Steel Corp. Subsidiary)
Roebling's, John A., Sons Co.

Wire Cloth
Cleveland Wire Cloth & Mfg. Co.
Ludlow-Saylor Wire Co. Inc.
Roebling's, John A., Sons Co.
Wickwire-Spencer Steel Co.

Wire Cloth (Manganese)
Taylor-Wharton Iron & Steel Co.

Wire (Flat, Round, Square or Special Shapes)
Wickwire-Spencer Steel Co.

Wire (Piano and Music)
Wickwire-Spencer Steel Co.

Wire Rope
American Cable Co., Inc.
American Steel & Wire Co. (United States Steel Corp. Subsidiary)
Bethlehem Steel Co.
Broderick & Bascom Rope Co. (Yellow Strand)
A. Leschen & Sons Rope Co.
Macwhyte Co.
Roebling's, John A., Sons Co.
Wickwire-Spencer Steel Co.

Wire Rope Fittings
American Cable Co.
American Steel & Wire Co. (United States Steel Corp. Subsidiary)
Bethlehem Steel Co.
Broderick & Bascom Rope Co. (Yellow Strand)
A. Leschen & Sons Rope Co.
Macwhyte Co.
Roebling's, John A., Sons Co.

Wire Ripe (Monel-Metal)
Macwhyte Co.

Wire Rope (Non-Corrosive)
Macwhyte Co.

Wire Rope Slings (See Slings, Wire Rope)

Wire Rope Sockets (See Sockets, Wire Rope)

Wire (Rubber Insulated)
American Steel & Wire Co. (United States Steel Corp. Subsidiary)

CLASSIFIED ADVERTISEMENTS—*Used Equipment For Sale*

CONSOLIDATED
GOOD USED EQUIPMENT

1—24"x36" Bacon-Farrel Jaw Crusher.
1—24"x36" Allis Chalmers Jaw Crusher.
8—Jaw Crushers: 4x10", 10x7" Farrel; 6x24", 7x24" Sturtevant reduction; 9x15" Champion—other sizes & types.

5—Ruggles Coles Class "A" Direct Heat Rotary Dryers: 5x26', 5x30', 80"x40', 70"x45', 8'8"x85'.
12—Direct Heat Rotary Dryers: 3x30', 4x30', 5x30', 5x60', 6x40', 6x50', 6x60', 8x60'.
7—Rotary Kilns: 5x30', 6x60', 7x100', 8x110', 8x125', 9'6"x150'.

1—4x8' Allis Chalmers Vib. Screen, 2-deck.
3—3x6' Niagara Screens, 2-deck.
1—24" Stone Elevator, chain, 70' c/c.
8—Tyler Hummer Screens—3x5', 4x5', 4x7', Types 31, 33, 37, 39, 60.
2—Tyler V-32 Vibrators. Mag. units only.
4—Single Roll Crushers: 18x16" Penna., 18x18" Jeffrey, 18x24" McLanahan, 24x24" Link Belt.
10—Crushing Rolls: 20x14" Sturtevant; 24x14", 36x16" "B" Allis Chalmers; and larger.

2—24" No. 4 Mikro Pulverizers, each triple screw feed and stirrup hammers for fine pulverizing of clays, etc.

2—10' Sturtevant Air Separators.
1—5 Roll Raymond High Side Mill.
3—4 and 5 roll Raymond Low Side Mills.
5—Raymond Pulverizers: Nos. 0000, 00, 1, 2.
7—Raymond Imp Mills: Nos. 2, 33, 45, 50, 55.
7—Hardinge Iron lined Ball Mills: 3'x8", 4½'x16", 6'x16", 6'x22", 8'x22", 8'x30".
1—No. 32 Marcy Ball Mill.
1—3'x12' Hendy Iron lined Tube Mill.
1—5'x22' Bonnot iron lined Tube Mill.

Just a partial list
WE WILL BUY A SINGLE MACHINE OR COMPLETE PLANT
What do you wish to sell? Send us details.

CONSOLIDATED PRODUCTS COMPANY, INC.
15-16-17 Park Row **New York, N. Y.**
Plant and Shops at Newark, N. J., cover 8 acres of ground.

FOR SALE

1—60x16 Bartlett & Snow Washing Screen.
1—48x16 Bartlett & Snow Washing Screen.
1—Telsmith No. 5 Crusher.
1—Traylor No. 5 Crusher.
1—Allis-Chalmer No. 4 Reduction Crusher.
1—10" All Electric Suction Dredge.
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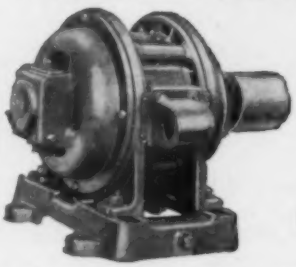

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SHOVELS & CRANES. 1—2 yd. capacity, Electric, crawler tread, Crane and Dragline Unit, 60' boom, full revolving, 3 phase, 60 cycle, 2200-440 volt, capacity 24 tons at 15' radius; 5 tons at 60' radius. Also, one same as above, Diesel operated. 1—Northwest model 105, gas, crawler Crane, 1 yd. capacity, 45' boom, 1 yd. clam shell bucket. 1—Byers, gas, crawler tread, ½ circle swing, ½ yd. capacity, with crane boom, skimmer scoop and trench hoe attachments. 1—Butler Shoveloder (Nordberg) model 109, air operated, adjustable track gauge.

CRUSHERS. 2—18x36 and 2—24x36 Jaw Crushers. 1—Reliance, all steel, 14x24 Jaw Crusher. 1—Symons 2 ft. Cone Crusher.

CRUSHING PLANTS. 2 Complete Plants with all auxiliary equipment, in whole or separate items.

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CLASSIFIERS. 2—Dorr duplex 8'x39', rake and bowl Classifiers with or without 18' diameter bowl.

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PUMPS. 2—5" Centrifugal, bronze fitted, direct connected to 75 and 100 H.P., 440 volt motors, 950 GPM @ 180 ft. head and 1000 GPM @ 274 ft. head.

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25—40 ton steel u/f flats.
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200—30 ton steel u/f box cars.
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1—15-20 ton Link-Belt. 50 ft. boom.
1—30 ton Browning No. 8. 50 ft. boom.
1—30 ton Ohio. 50 ft. boom.
1—40 ton Brownhoist. 50 ft. boom.

Saddle Tank Locomotives

1—32 ton American. Std. Ga.
1—40 ton Baldwin. Std. Ga.
1—40 ton geared Heisler. Std. Ga.
4—50 ton Baldwin 6-wheel Switchers. Tender type. ICC condition.

Narrow Gauge Dump Cars & Locomotives. Standard Gauge Dump Cars & Switch Engines

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Portable and stationery, belt with elec. or gas power, sizes from 21 cu. ft. to 1,600 cu. ft.

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1—4 yd. Hayward Class "O" clamshell.
24—Williams, Blaw Knox, Owen clamshell buckets, all sizes & Types.
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Large lot including std. ga. 6 and 12 yd. and 20 yd., 36 in. ga. 5 yd. and 24 ga. 1½ yd.

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1—Central mixing plant consisting of 40-S 1½ yd. Smith tilting mixer, 225-ton Blaw Knox 3-compartment steel bin with 3-beam scale; 1—650 bbl. Blaw Knox round cement bin with weigh batcher & bucket elevators.

CRANES AND DRAGLINES
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1—Northwest Model 104 ser. No. 2079, 45' boom, 1¼ yd. bucket.
1—Northwest Model 105 ser. No. 2055, 40' boom, 1 yd. bucket.

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1—Link Belt Model K-1 crane, shop No. 1024, 50' boom, 1 yd. bucket.
1—Osgood heavy duty dragline ser. No. 2069, 40' boom, ¾ yd. bucket.
1—Industrial Brownhoist No. 1, ser. No. 10957, 35' boom, ½ yd. bucket.
1—Byers Bearcat crane, model 26, ser. No. 20474, half circle swing, ⅜ yd. bucket.
1—Erie type B-2, ser. No. 4241 steam crane, 40' boom, 1 yd. bucket.

CRUSHERS
1—Symons size 5½ coarse cone type No. 5H.
1—Allis Chalmers size No. 6, style N; openings 12 x 44 in.
2—McCully No. 3 gyratory crushers.
1—48"x60" Allis Chalmers Superior jaw crusher.
1—Climax No. 2½ jaw crusher, 10x20 in. No. 2637.
1—Telsmith No. 9A jaw crusher, ser. No. 4139, 9x16 in.
1—Allis Chalmers smooth type crushing rolls, size 42x16 in.

DERRICKS
4—All steel stiff leg derricks: 1—15 ton Debbie, 80' boom; 1—15 ton Clyde, 50' boom; 1—15 ton Clyde "A" frame barge derrick, 50' boom; 1—10 ton Insley, 80' boom.
4—Steel guy derricks, 6 ton cap., Bedford, 80' boom, 90' mast.

DRILLS
6—Wagon drills, Ingersoll Rand & Gardner Denver, with IRX71 & GD17 and 21 drills.

LOADERS
1—Barber Greene model 42-A.
1—Haiss model A.

LOCOMOTIVES
6—Elec. storage battery type, 4 ton, 24" ga. with battery boxes: 4—Whitcomb; 2—Atlas.
23—Gas locomotives: 6—6 ton Vulcan, std. Ga.; 2—7 & 8 ton Whitcomb, 36" ga.; 2—4 ton Vulcan & Davenport, gear drive, 36" ga.; 1—4 ton Plymouth friction drive, 36" ga.; 7—7 ton Whitcomb & Plymouth, gear drive, 24" ga.; 5—Plymouth 4 ton, 24" ga.

PUMPS
4—10" Allis Chalmers centrifugal pumps, direct connected to 2 HP, 440 V, A.C. motors; cap. 3500 GPM, 175' head.
5—Dredge pumps: 1—10" Morris manganese; 1—8" Cataract No. 175895; 1—8" Morris; 1—6" Erie; 1—6" Fairbanks Morse Woods trash pump.

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LOCOMOTIVES

14 Ton Porter 36" gauge, four wheel saddle tank locomotive, 9x14" cylinders, built 1923.

21 Ton Vulcan 36" gauge, four wheel saddle tank locomotive, 11x16" cylinders, built 1923, National Board Boiler.

30 Ton Vulcan, 36" gauge four wheel saddle tank locomotive, 13x18" cylinders, built 1922, A.S.M.E. boiler.

50 Ton American four wheel saddle tank locomotive, 16x24" cylinders, A.S.M.E. boiler.

52 Ton Baldwin six wheel switching locomotive with separate tender, 18x24" cylinders, A.S.M.E. boiler.

50 Ton Baldwin six wheel switching locomotive with separate tender, 17x24" cylinders, A.S.M.E. boiler.

30 Ton Plymouth four wheel gasoline locomotive.

25 Ton Plymouth four wheel gasoline locomotive.

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Birmingham, Alabama

FOR SALE

1—P & H 400 ¾ yd. Rebuilt gasoline comb. shovel and crane.
1—Byers 80 ¾ yd. gasoline crane New 1936.
1—Byers 125—1½ yd. gasoline Dragline New 1936.
1—Erie Type B ¾ yd. steam comb. shovel and crane.
1—Marion 36 Steam shovel extra length boom and dipper sticks.
1—Marion 31 Steam comb. shovel and crane.
1—37 Kennedy Van Saun gyratory crusher with V belt drive and motor.
1—8 inch McCulley gyratory crusher.
1—No. 2 Austin gyratory crusher.
1—10x20 Blake jaw crusher.
1—8x20 Wheeling jaw crusher.
1—18x24 Crushing rolls.
1—Sauerman Slackline Elec. Hoist with 150 hp. motor.
1—12 inch Amsco dredge pump 250 hp. motor direct connected.
1—Set Link Belt dredging elevator—2-30 inch continuous buckets 36 ft. centers with extra parts for longer centers.
1—Orange peel bucket.
1—Dorr washer with sand drags.
1—Air compressor.
1—55 ft. steel ladder for dredge boat.
1—60 ft. steel spud for dredge boat.
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6—Transformers and various motors.

Elwood Sales and Manufacturing Co.
LAFAYETTE, INDIANA

JAW CRUSHERS
10x8, 13x7½, 14x7, 15x9, 15x10, 16x9, 16x12, 16x10, 18x11, 20x8, 20x6, 20x10, 26x12, 20x11, 28x12, 30x15, 30x13, 36x30, 36x15, 36x14, 36x9, 36x6, 38x18, 36x10, 36x24, 42x9, 48x36, 60x42 and 84x66.

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Nos. 24, 37 and 49 Kennedy Gearless.
18 in., 24 in., 30 in., and 36 in. Symons Disc.
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4—Nos. 5, 3 & 6 Austin Gyratory.
36 in. and 10 in. Superior McCullys.
2 Traylor T-12 Bulldog Gyratory.
No. 8 Telsmith 18x75 Gyratory.
No. 5 Telsmith 10x96 Gyratory.
No. 6 BH Traylor Fine Reduction.
17 Gates K—Nos. 3, 4, 5, 6, 7½, 8 & 9½.

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½ yd. cap. Owen M Digger.
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WE OWN AND OFFER PRICED RIGHT FOR QUICK SALE

2—6'x60' Bonnot Rotary Kilns.
1—6'x50' Ruggles-Cole Rotary Dryer with link belt reduction unit and motor drive.
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3—Raymond Mills No. 3, No. 1, No. 00, No. 0000.
1—P. & M. 12x12" Crushing Rolls.
1—6'x6' Abbe Pebble Mill.
2—Novo Gasoline Driven Hoists.
18—Motors, 10 to 75 h.p., 3 ph., 60 cy., 440 v.
4—Link-Belt 60" Dehydrating Cones.
2—Plymouth 3 ton, 36" gauge Gasoline Locomotives.
1—Ingersoll-Rand Portable Gasoline Air Compressor, 120 CFM.
1—Ingersoll-Rand type ER1, 7x7" Air Compressor with motor drive.
1—Link-Belt 3x8' Vibrating Screen.
20—Sanford Day 36" gauge Dump Cars, 3 ton capacity.
5400 Ft.—90 pound Rail.

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Jaw Crushers—4"x8" up to 66"x84".
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Rotary Fine Crushers—No. 1, No. 0, No. 00.
Direct Heat Rotary Dryers—4'x30', 5'x50', 5½'x35', 6'x60', 3½'x25', 8'x50'.
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Hardinge—Marcy & Fuller—Lehigh Mills.
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New rotary dryers made for all purposes.

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1—45 H.P. 4 cylinder Waukesha

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1—14 x 12 Ingersoll-Rand.
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1—6½ YD. STRIPPING ELECTRIC SHOVEL, Bucyrus 320-B.
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1—Monighan Steam Dragline.
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2—21 ton Saddle Tank Porter Locomotives, 36" ga.
36—Western 5 ton Dump Cars, 36" ga.
4—Western 12 yd. Dump Cars, Std. ga.
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3—50 HP electric shaft hoists.
⅛ yd. Byers comb. shovel crane.
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¾ yd. Northwest shovel.
1 yd. Northwest shovel.
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⅜, ½, ⅝, ¾ and 1 yd. Gasoline and Steam Shovels.
2, 2½, 3 and 8 yd. Electric Shovels.
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Steam, Gasoline and Belted Hoists.
20 and 30 ton std. ga. Locomotive Cranes.
Jaw Crushers 8x12" to 66x84".
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20 ton American Guy Derricks, also stiff leg derricks.
36" ga. Steam Locomotives, 9-32 tons.
Std. ga. Steam Locomotives 25-75 tons.
Gasoline Locomotives 3-25 tons, various gauges.
Clamshell Buckets, ½, ⅝, ¾, 1, 1½, 1½ and 2 yd.
Page Dragline Buckets, ¾, 1, 1½, 1¾ and 2 yd.
100 HP Fairbanks Morse Y-V Diesel Engine.
Special—125 HP Venn Severin Diesel. Rebuilt.
Others up to 600 HP with and without generators.
Natural Gas and Steam Engines.
Let me have your inquiries, also list of surplus items.
Ask for Bulletin No. 37.

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1—Quarry outfit consisting of 42" bucket elevator with steel bins having machinery house on top and Link-Belt gates at bottom for loading cars; six gasoline locomotives, rails, switches, etc., all in fine condition. This equipment capable of handling 2200 to 2500 tons daily—available for sale because of change in plan of operation. Write for full information to

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Jaw Crushers—10½x20, and 10x18.
Gyratory Crushers—8 in. and 13 in. McCulley.
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I.R. 4½x12 Quarry Bar and X71 Drifter.

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8 ft. x 10 ft. Marcy Ball Mill.
11—4 Yd. Koppel & Atlas Rock Cars, Brakes, 36".
12 Ton Vulcan Gas Locomotive, air brakes, std. g.
Sullivan WL4 Comp., 238 ft., V Belt.
Ingersoll ER1 Comp., 10 x 10, belted.
9 x 16 Portable Crushing Plant with bin.
Rotary Dryers: 5'-6" x 84 ft., 6'-0" x 50 ft., 5'-8" x 60 ft., 4'-0" x 30 ft., 3'-6" x 24 ft., 3'-0" x 20 ft.
Tube Mills: 4 x 16 ft., 5 x 18 ft., 5 x 22 ft., 5½ x 20 ft.
No. 6 Williams Universal Fine Grinder.
No. 36 American Ring Roll Mill.
No. 3 Regular & No. 4 Jumbo, Williams Hammermills, No. 5040 Dixies, 42 x 48 Jeffrey B & 42 x 36 Jeffrey E.
Jaw Crushers: 42 x 30, 36 x 30, 36 x 6, 30 x 13, 10 x 18 & 9 x 16.
1 Yd. Elec. & Gas Slack & Drag Lines.
125 Ton Fairbanks R.R. Scale—50 ft.
Several Derricks & Hoists, Elec. & Gas.

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No. 3 Standard Jay Bee Hammer Mill, complete with Fan and Dust Collector. Made by Bossert Corp., Utica, N. Y. SKF Ball Bearings; 15¼x12 feed opening; 3,000 RPM; 6Dx8F pulley; 25 to 40 HP; 35"x58" floor space; 50" high; 36 Indestructible Steel Hammers; 1,500 lbs. total wt.; grinds coal, clay products, chemicals, limestone and granite. Costs $1,575.00 new. Used very little; will sell cheap.

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Good Equipment—Priced Right

1—Butler batcher plant 150 yds., 3 compts., weigh batchers, cement bin, conveyors, elevators, complete.
1—Butler batcher plant 125 yds., combined material-cement bin, weigh batchers, conveyors, elevators, complete.
1—Butler 2 compartments 220 yds. steel bin.
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5—Jaeger 8 yards separate engine driven truck mixers.
1—Fuller-Kinyon portable self propelled bulk cement unloader.
2—Fuller cement bins, 155 bbl. cap., with automatic batchers.
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1—American 40 ton, std. ga. saddle tank loco.
1—Truck crane, Browning, very fine.
1—Loco. Whitcomb, 20 tons, 36" gauge, gas.
1—Loco. Vulcan, 20 tons, 36" gauge, gas.
1—Loco. Whitcomb, 14 tons, 36" gauge, gas.
1—Loco. Vulcan, 4½ tons, 36" gauge, gas.
1—Sand pump, 8", cent. Gould.
1—Elevator, buckets 8"x6"x12", centers 32'.
1—Sauerman gas hoist dbl. drums, 50 h.p.
1—AMSCO 2" dredge pump, 150 HP, AC elec. drive.
1—Locomotive crane, Ohio 25 tons, 60' boom.
Jaw crushers, 7x12, 9x15, 11x26, 24x36. Many others.
1—Clyde 3 drum, with swinger, electric hoist 75 h.p.
1—Derrick, steel stiff leg, 80' boom, cap. 10 tons.
4—Guy derricks, booms up to 100' 7½ to 10 tons cap.
1—Barnes cent. pump, 8" gas driven.
1—Lawrence cent. pump, 8" gas driven.

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DEPENDABLE EQUIPMENT

1—10B3, 2—9B3 and 1 No. 7 McKiernan-Terry Steam Hammers.
1—3-Drum Thomas Elec. Hoist with boom swinger
1—75-B, 1½-yd. Gas Shovel
1—75-B, 1¼-yd. Gas Shovel—Dragline 55' boom, 1-yd. bucket
1—50-B Bucyrus Deisel Dragline
1—50-B Bucyrus Steam Shovel
1—50-B Bucyrus Steam Crane
2—Vulcan, 16-ton gasoline locomotives.
7—21-ton, 11x16, Std. Ga. Davenport & Vulcan Locos.
2—25-ton, 12x16, Std. Ga. Davenport Loco.
1—28-ton, 12x18, Std. Ga. Vulcan Steam Loco.
2—38-ton, 14x22, Std. Ga. American Steam Loco.
4—50-ton, 17x24, Davenport, 6-wheel Switchers
2—No. 9-C Browning Steam Locomotive Cranes 12-yd., 16-yd., 20-yd., 30-yd. standard gauge Dump Cars
General Construction Equipment

CLAPP, RILEY & HALL EQUIPMENT CO.
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IDEAL MOLDS. 17 flower vase and flower-box molds. 3 birdbath and 2 bench molds. 15 different pier block molds, also cap molds and ball mold 12x12 inch base. Buy now and have your stock ready for that Spring rush.

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Complete Stone Crushing Plant

Including, 120 H.P. Waukesha Motor, Two Crushers, Elevator, Screen, Bins and Scale. A1 condition.

TEMPLE SLAG CO., INC.
Temple, Penna.

FOR SALE

3—25/30 Yard LeTourneau Buggies.
3—No. 60 Caterpillar Gasoline Tractors.
1—No. 75 Caterpillar Diesel Tractor.
2—LaPlante-Choate 10 yd. Crawler Wagons.
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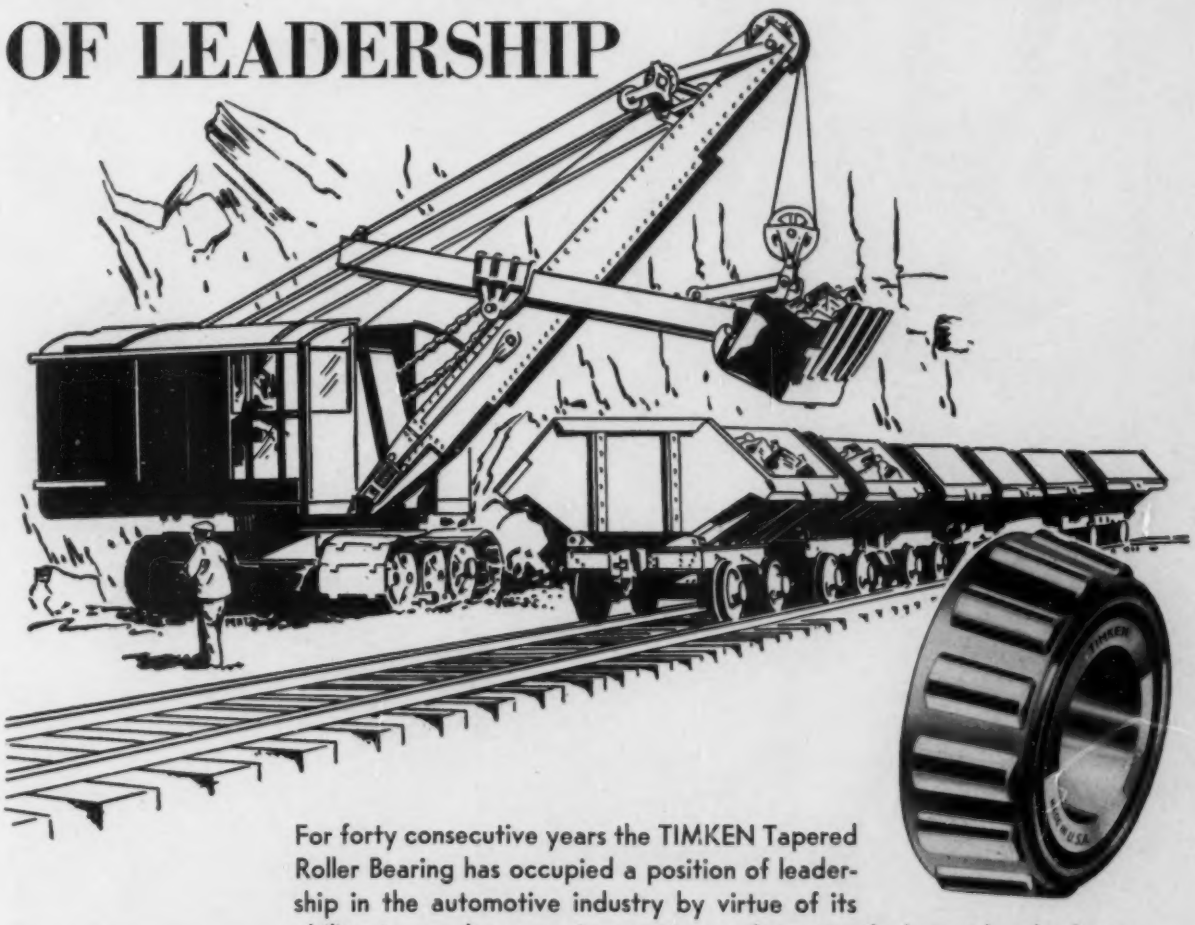

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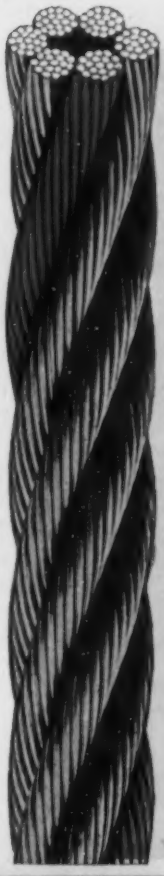

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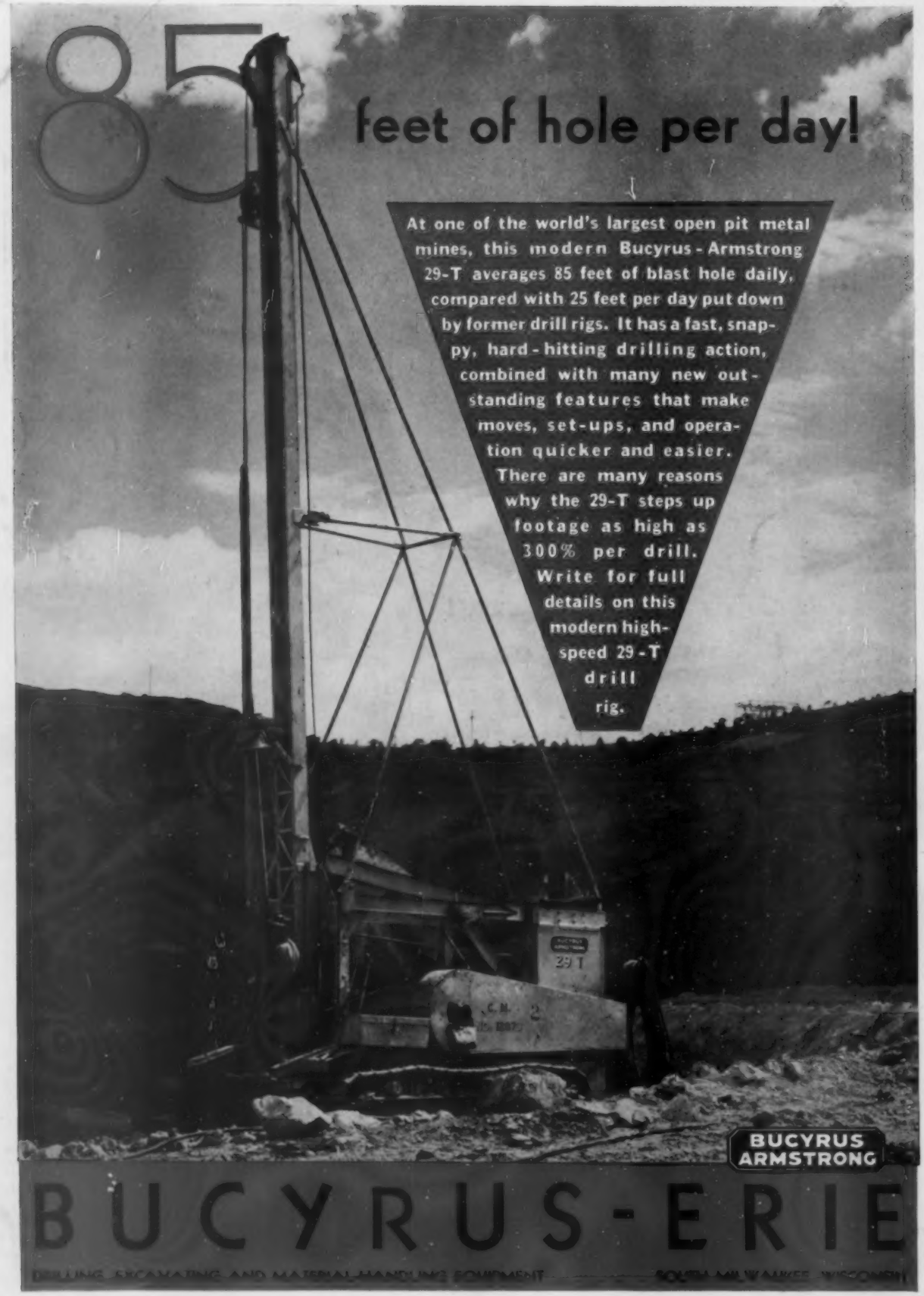
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